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ABSTRACT

This collection contains nine essays, written by fellows in Princeton University's Mid-Career Fellowship Program, on contemporary issues facing community colleges. The essays included are "Language Minority Crossover Students: A Program to Address a New Challenge at Bergen Community College" (Brian Altano); "Retention Strategies for Women in the Physical Sciences at Bergen Community College" (Lynda Lynette Box); "Educational Marketing: An Essential Tool for Managing Change" (Bonnie S. Dimun); "Using Technology to Revitalize the Lecture: A Model for the Future" (Marilyn Joyce Gilroy); "Survey of Technology Use in Mathematics at New Jersey's Community Colleges" (Jean M. Lane); "It's Recruiting, Stupid! (Reinvigorating a Two-Year College Honors Program)" (Karl Oelke); "Multimedia in Lectures and on the World Wide Web" (Brian Pankuch); "Using Multimedia for Teaching Analysis in History of Modern Architecture" (Garry Allen Perryman); and "A Modest Projection: A Satirical Inquiry into the Demise of Community Colleges" (John Leslie Smith). (YKH)

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Issues of Education at Community Colleges

Essays by Fellows

in the

Mid-Career Fellowship Program

at Princeton University

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LANGUAGE MINORITY CROSSOVER STUDENTS: A PROGRAM TO ADDRESS A NEW CHALLENGE AT BERGEN COMMUNITY COLLEGE

Princeton Mid-Career Fellowship

Brian Altano
Bergen Community College
May 1, 1998

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SUMMARY

This project has been prepared in part in response to observations made by English Basic Skills faculty concerning the growing number of apparent E.S.L. students enrolled in English Basic Skills (EBS) courses. Historically, there have always been some E.S.L. students in EBS courses; however, the faculty have observed that the number of students with E.S.L.-type problems and the extent of their language interference problems in reading and writing have dramatically increased. For the most part, these students have attended high school in the U.S.; thus, their listening and speaking skills are often stronger than writing and reading abilities. Since EBS classes are not designed for a language minority population because the majority of the students in these courses are Americans, the faculty are faced with new challenges in terms of curriculum, instructional strategies, and assessment of progress. In addition, placing the student in the American Language Program (as the E.S.L. Department is called at Bergen Community College) is not recommended because students are restricted to English language courses while in the program. The areas in which these students need improvement and instruction often differ quite extensively from those of the native speaker of English.

The project proposes to provide a comprehensive program to address this challenge. The Plan of Operation is divided into five components: 1) identification, testing, and placement; 2) orientation and dissemination of information; 3)The English Language Resource Center (ELRC): supplemental instructional support; 4) course development and customization, including the use of the Internet; and 5) tracking student progress; measuring the satisfaction of project objectives.

Identification, testing, and placement of the language minority crossover student is a key element in the process. Crossover students, that is, those E.S.L. students who have attended American high schools, are placed in EBS courses, but still present E.S.L.-type problems, will be identified through the inclusion of an ALP faculty member in the reading of the essays on the New Jersey Basic Skills Test. Since part of the current problem may have to do with inappropriate placement tools used at the College, particularly for students who took E.S.L. in American high schools, this aspect will be studied, and alternative testing strategies will be analyzed. The testing process will be retooled with the inclusion of the Levels of English Proficiency Test (LOEP) to discriminate the difference between Basic Skills and E.S.L. placement. The second component, orientation and dissemination of information, is based on the translation of the ALP brochure, an introduction to testing and placement procedures, and a counseling sheet into the target languages of the language minority population. An orientation program will be designed to introduce the ALP to language minority students; the program will be videotaped, recorded, and made available at the B.C.C. library and at area high schools and libraries. A computer-based version of the orientation will also be prepared and offered at the College's website. The ELRC, established through the Vocational Educational Grant (Perkins), and now operating through College funding, will be used for the third segment of the project, with a language skills assessment and the stipulation of a customized study plan prepared by an ALP faculty member, the involvement of professional tutors to monitor student progress, and peer tutors to provide language enrichment. In the fourth component of the project, faculty will analyze the curriculum in the EBS courses taken by the language minority crossover students, introduce new learning modules, and utilize the Internet for curriculum enrichment. The last segment involves tracking student success and ascertaining that objectives have been met.

1. The American Language Program and the English Basic Skills Programs at Bergen Community College

1.1 Background: American Language Program and English Basic Skills Program

The American Language Program at Bergen Community College was instituted in 1977 and was divided into three levels. In 1991, another level was added to serve the needs of a new student population with little or no previous English language training. From an original base of 100 students in the late 1970's and early 1980's, the program has grown tenfold, with the current student population in ALP courses more than 1000. The English Basic Skills Program enrolls approximately 2000 students per semester (100 sections, twenty students per section) and is divided into two pre-academic sequences, and additional instructional units to be taken in conjunction with Composition I. Thus, 3085 of the 12,100 students enrolled at Bergen Community College are receiving pre-academic English instruction.

The American Language Program is composed of nineteen full time faculty members. Fourteen are tenured, three are on tenure-tracks, and two hold lecturships. The discipline employs fifty-five adjuncts per semester. The English Basic Skills faculty is composed of ten tenured faculty members, five lecturers and twenty-five adjuncts.

1.2 Student Demographics: ALP

The students registered in American Language courses come from thirty-seven different countries and reflect the demographics of Bergen County. This population has changed a great deal in the two-decade history of the program. The students were predominantly Hispanic and Middle Eastern in the first decade, especially Iranians. In the latter part of the 1980's the program witnessed an influx of Japanese students, primarily women, with a continuation of strong enrollment by South and Central Americans (Colombia, Venezuela, Guatemala, El Salvador, Costa Rica). Additional groups with strong representation in this period were Vietnamese and Afghanis. The 1990's have seen the predominance of three groups: Koreans, who comprise more than 30% of the current enrollment, eastern Europeans, principally from Poland, Russia, and the former Soviet Republics, and students from India. The number of Chinese students has also risen dramatically in recent years.

In respect to placement, there has been a gradual but constant shift towards the lower levels. Whereas in 1993, 78% of the students placed in Levels II and III, in recent years a significant number of students have been placed at Foundations and Level I (53% of those tested in Fall 1997).

In terms of total enrollment, the Program has more than doubled its enrollment in the last decade, from 452 in 1988 to 1085 in Fall 1997. Statistics for Spring 1998 have indicated a shift away from afternoon and evening classes towards a predominance in early and mid-morning.

1.3 Placement Testing: ALP

Students seeking to enroll in the American Language Program for the first time take the CELT Examination together with the Flopi (a test devised by Bergen's ALP faculty to differentiate between Level I and Foundations, a distinction which the CELT is not designed to make). A writing sample is evaluated and substantiated by the results on the objective structure

part of the examination, with placement according to the following scheme: 0 - 30: Foundations; 31 - 40: Level 1; 41 - 60: Level 2; 61 - 80: Level 3; Above 80: Composition 1 (waived from all American Language courses).

If a student has taken the TOEFL examination, these results are evaluated for placement: with a score of 550 or above a student is exempt from the program and is placed directly into Composition I. Students with scores of 500 - 549 are placed in Level III. Students scoring below 500 on the TOEFL test must take the CELT test for placement. In addition, if a student has attended another college and taken E.S.L. courses, the transcript in evaluated and placed appropriately. The levels studied by students wishing to transfer from the Adult Learning Center of Bergen Community College to the American Language Program are also used for placement.

Students who have been in the United States for more than eight years or who have attended three or more years of American high school take the New Jersey Basic Skills Test.

1.4 Placement Testing: English Basic Skills

Entry into the English Basic Skills program is determined by a student's Total English score on the New Jersey College Basic Skills Placement Test (NJCBSPT). Total English is a scaled score combining test elements in reading comprehension, sentence sense, and essay writing. Entry level placement may be challenged through a Challenge Test procedure. Students are placed in an English Basic Skills program or directly into Composition I upon the following score categories:

135 - 155:	Developmental Skills I - II sequence
156 - 160	English Skills
161 - 164	Directed Studies in Writing as a co-requisite of Composition I
165 or above	Composition I

1.5 Levels and Courses Offered: ALP

The American Language Program is divided into four levels: Foundations, Level I, Level II, and Level III. The Foundations Level was instituted in 1991 to fill a need at the lowest level. The growing number of true beginners (those with no formal English language training prior to enrollment) presented a challenge that was addressed by expanding the ALP to include basic language training. The introduction and expansion of the Foundation Level (the addition of Grammar Part B in 1995) necessitated the revision and upgrade of the syllabi in all courses at Levels I, II, and III. The course revisions were completed in 1996.

At each level in the Program, students must complete five courses for fifteen credits, taken either full or part-time: Reading, Writing, Grammar Part A, Grammar Part B, and Speaking and Listening. Thus, a student placed in the Foundations Level of the American Language Program would take four fifteen-credit semesters before gaining eligibility to take college-level courses.

Waivers of courses are possible, but rare. In Speech, students are retested with the listening segment of the CELT examination and may be moved up a level if there proficiency so merits. Students enrolled in Reading, Writing, and Grammar courses may be recommended for re-placement by their instructors. However, the process must be completed by the end of the

drop/add period in registration (usually before the tenth day of the semester). In the academic year 1997 - 1998 only six students were moved up in Reading, Writing, and Grammar courses. There is no specific retest for re-placement, and the process must be initiated by the student's instructor.

1.6 Levels and Courses Offered: English Basic Skills

The English Basic Skills Program is composed of the following instructional units: Developmental Skills I - II sequence, English Skills, Directed Studies in Writing, and Directed Studies in Academic Skills. *Developmental Skills I* is a one-semester, 5 non-degree credit reading/writing course containing a 3-hour instructional unit (WR014) and a 2-hour practicum (WR015). *Developmental Skills II* is a one-semester, 5 non-degree credit reading/writing course containing a 3-hour instructional unit (WR016) and a 2-hour practicum (WR017). Developmental Skills I and II are sequential courses. *English Skills* is a one-semester, 5 non-degree credit reading/writing course containing a 3-hour instructional unit (WR023) and a 2-hour practicum (WR024). *Directed Studies in Writing* is a one-semester 1 non-degree credit course which supplements primary instruction in English Composition I, and is taken as a co-requisite in the same semester. *Directed Studies in Academic Skills* is a one-semester 3 non-degree credit course which reinforces reading, writing, and study skills. This course is restricted to students in the AIMS program.

1.7 Computer Assisted Instruction

The American Language Program has one computer laboratory designated for instruction (S-360), with twenty-five workstations which run several grammar, reading, and writing software programs. The lab is in use five days per week from 8:20 a.m. until 4:10 p.m. and from 6:00 to 9:00 p.m. Students in Grammar A and B at all levels use *Grammar Mastery*, a program written by American Language Academy (A.L.A.). Approval has been given to purchase and install the *Grammar Mastery* multimedia edition (with voice recognition and recording and listening activities), and the *Focus on Grammar* multimedia edition. These programs will be installed in July 1998. In addition, students have access to the traditional *Grammar Mastery* program in a free-time laboratory (S-354), open to students from 9:00 a.m. to 9:30 p.m. weekdays and 9:00 a.m. to 2:00 p.m. on Saturday.

1.8 The English Language Resource Center (ELRC)

As part of a three-year Federal Vocational-Educational Grant received by the College in 1994, the English Language Resource Center was established. The ELRC is a center of tutoring, conversation groups, reading and writing activities, test preparation, and classes on study techniques. The Center employs twelve peer tutors paid by the College for a maximum of eighteen hours per week. In addition, the ELRC has become a fulcrum of cutting edge computer programs purchased through grant and matching funding. The College has made a strong commitment to the Center by hiring a full-time Supervisor in January 1997. The Center is in operation thirty-five hours per week. The use of the facilities of the ELRC is an important aspect of the proposed Project.

The current population using the services of the ELRC is composed primarily of students in pre-college non-degree credit English as a Second Language courses. However, students in A.A.S. programs, specifically Allied Health and Accounting, have been target populations in the past, and vocational education students continue to receive English language support.

1.9 Mission Statement

As part of the preparation of a mission statement for the College and its various divisions and departments and as a result of preliminary work performed for the Middle States Evaluation self-study of the specific discipline, the following mission statement was stipulated for the American Language Program:

"The mission of the American Language Program at Bergen Community College is to provide comprehensive English-as-second-language instruction to Bergen County residents with different language needs and skills and diverse academic backgrounds. The program seeks to improve the grammar, reading, writing, speaking, and listening skills of students in order to prepare them for college-credit courses and to help them function in the social and business world of the United States. The program serves its students by helping them achieve their immediate and long-term academic and career goals; by preparing them to benefit from and contribute to college classes, it also helps enrich these classes for American students. The program benefits the college community by helping both native and non-native students, and faculty as well, to better understand not only American history and society, but also the cultures of both the Western and non-Western societies represented by the students registered in courses in the American Language Program."

2. EXTENT OF NEED OF THE PROJECT

2.1 The Target Population

The target population is estimated at 150 - 175 students per year; thus, 300 - 350 students for the two-year term of the project.

This project has been prepared in part in response to observations made by English Basic Skills teaching faculty concerning the growing number of apparent ESL students enrolled in English Basic Skills courses. Historically, there have always been ESL students in English Basic Skills classes; however, the faculty have observed that the number of ESL students and the extent of their second language interference problems in reading and writing have dramatically increased. The increase in ESL students can be explained by the general increase in the non-English speaking population of Bergen County and specifically by increases in high school aged ESL students. The process by which students are admitted to the college, tested for reading/writing proficiencies, and placed in either the English Basic Skills program or the American Language Program has worked effectively in the past; however, these recent increases in ESL students in the English Basic Skills program suggest that this process should be reviewed and perhaps revised.

Placement in American Language courses is problematic because students are restricted to English language courses while enrolled in the program: they are not permitted to take college-level courses until they have passed the exit examination at the third level of the

program. Similarly, placement in traditional English Basic Skills courses presents problems because the course was designed for native language speakers and not language minority students. Instructors are unprepared for the challenges presented by these new students, and the students are not receiving the customized instruction that they require.

In general, non-native speakers of English who have completed a minimum of three years in an American high school and graduated, or who have passed the GED examination in English, or who have resided in the United States for at least eight consecutive years are required to take the basic skills placement test (the NJLBSPT). In contrast, non-native speakers of English who have completed fewer than three years in an American high school even if they graduated, or who have passed the GED in a foreign language, or who have resided in the United States for fewer than eight consecutive years are required to take the Comprehensive English Language Test (CELT).

Those language minority students enrolling in English Basic Skills courses have generally been from the recent high school graduate category. Although they have completed at least three years in an American high school and graduated, their reading and writing skills indicate that perhaps they would be better served in the American Language Program as opposed to the Basic Skills program. However, experience with these students in American Language indicates that they are not achieving high levels of success. Thus, the project proposes to customize the English Basic Skills courses to better serve their needs.

The purpose of the first segment of the project is to identify those students who legitimately took the basic skills test but whose test results indicate that they might be in the language minority crossover category, to retest and replace these students using the LOEP test, to track the academic performance of these students in their reading/writing classes over two semesters, and to compare the performance of these students with those who were initially identified as probable ESL students but who did not elect to be retested and replaced with the CELT. These students will be provided with computer-assisted language enrichment, tutoring and mentoring,, an extensive orientation program. Their progress will be tracked and monitored through communication with their professors.

Ultimately, the results of the this study will help to determine whether or not fundamental changes in our testing and placement rules are necessary or whether a formal secondary screening process is warranted to capture those students who have graduated from American high schools but who still display significant second language interference problems in reading and writing.

2.2 Analysis of Data From Fall 1997

A preliminary study was conducted by Michael Orlando, Associate Professor of English (who teaches in the Basic Skills Program and serves as its Coordinator) and Director of the Office of Testing, based on data collected from the Fall 1997 semester.

The students represented in this study were drawn from those matriculated students who applied for Fall 1997 admission and who initially took the Basic Skills Test between March 1997 and July 1997 inclusive. Approximately 1,500 students were tested during this period. Through the application process and the standard screening process that occurs at every test administration, it was determined that these 1,500 students were basic skills candidates given the selection rules described above.

Once the basic skills test was administered, the essay portion was the first to be evaluated. The essay evaluators, many of whom have had experience with ESL instruction, were asked to flag any essay that showed ESL characteristics such as the misuse of verb tenses, incorrect formation of plural nouns, absence or misuse of articles and prepositions, irregular idiomatic expressions and vocabulary, and excessive instances of phonetic spelling. These essays were held aside until the remaining multiple choice portions of the test were scored.

If the Total English score on the placement test, which is a combination of the reading, sentence, and essay subscores, was a scaled score of 144 or below, generally equivalent to the bottom 5% of all test takers, the student was placed in the study group. By means of this process, 42 students were identified for this study. In addition to receiving their basic skills score report, each of the 42 students was sent a ticket for the CELT and a letter stating that further placement testing was indicated based upon their initial test scores. Finally, the students in the study were retested and the results of the CELT were entered into their student records.

2.3 Results of the Analysis

Of the 42 students in the study, 16 did not enroll for Fall 1997 and, therefore, were discounted. Ten students chose not to take advantage of the opportunity to retest with CELT and enrolled in WR014/015 which was their initial English placement. Finally, of the remaining 16 who retested with CELT, 5 chose not to enroll for F97 while 11 actually enrolled in the ALP placement level that resulted from their retest with the CELT.

The following list shows the initial Total English score from the basic skills test as well as the ALP placement level that resulted from retesting with CELT for the 11 students in the final phase of the study:

Basic Skills	CELT
142	2
143	3
140	3
141	2
140	1
136	1
140	2
139	1
137	2
135	0
135	1

In general, students whose Total English score was between 135 and 139 when retested with CELT placed in Level 0 or 1. In addition, students whose Total English score was above 140 when retested with CELT placed in Level 2 or 3.

2.4 **Subsequent Performance Analysis**

At the conclusion of the Fall 1997 semester the academic performance of the 11 students who retested with CELT and who enrolled in the appropriate ALP Level will be compared to the academic performance of the 10 students who chose not to retest with the CELT but rather to enroll in WR014/015. If the failure rate of these 10 students significantly exceeds the course average, it may indicate that changes in the testing rules are necessary.

Although the number of students in the initial study is small, it may be sufficient to establish procedures for follow-up studies in subsequent test cycles. Data are being collected on students tested during the October 97 to January 98 cycle and will also be collected on students testing in future cycles. Once a sufficient number of students have been tracked, conclusions and recommendations will follow.

3. OBJECTIVES OF THE PROJECT

The following objectives have been stipulated for the project:

- To identify language minority crossover students through the Basic Skills Test essay
- To use other testing instruments, such as the LOEP, to achieve better placement of students
- To disseminate information on the American Language Program at Bergen Community College in the target language of the language minority crossover students, through translations of key material
- To provide a comprehensive orientation for the language minority students, focusing on their educational paths and objectives, and the services available to them.
- To hire an additional supervisory person at the English Language Resource Center to work closely with the target population, so that the hours of the Center are expanded from 35 to 53 hours per week.
- To train mentors to monitor the progress of the target population, ensure that the study plan devised by faculty is implemented and followed, and train peer tutors.
- To provide peer tutors who will work with the language minority crossover students to enrich their language skills and address challenges.
- To develop curriculum material in both the American Language Directed Studies courses (WR045, WR055, and WR065) and the English Basic Skills courses (WR016/WR017).
- To train the language minority students on the use of the Internet to improve their language skills, especially in reading and writing.
- To track the outcomes of the project through statistical analyses of student progress.

The language minority crossover population presents a challenge to many institutions in New Jersey. This project may be replicated in other institutions because of the comprehensiveness of the approach.

4. PLAN OF OPERATION

There are five components in the Plan of Operation:

1. Identification, testing, and placement
2. Orientation and the Dissemination of Information
3. The English Language Resource Center: Supplemental Instructional Support
4. Course Development and customization,
5. Tracking

4.1 IDENTIFICATION, TESTING, AND PLACEMENT

Students wishing to enter Bergen Community College must take a placement test to ascertain their skill level. American-born students and international students who have been in the United States for more than eight years take the New Jersey Basic Skills Test. Students who have attended three or more years of American high school also take the NJBST. These students are placed in either Remedial English (Basic Skills courses) or Composition I. Those in the U.S. for fewer than eight years and those with fewer than three years of American high school take the CELT test and may be placed in the American Language Program.

It is precisely those international students who have attended American high schools, regardless of the number of years, who represent the target population for the project.

The problem with the testing process as it relates to the target population is that many students are placed in remedial English courses or lower level American Language courses because of deficiencies in writing, reading, and grammar. At the same time, however, as a result of their extensive exposure to Americans and spoken English in high school, they may have strong speaking and listening skills, although this is not always the case.

The project activities related to testing and placement involve an initial screening to identify potential candidates for the test and the administration of a computerized placement test by Accuplacer. This test includes an additional testing instrument, the Levels of English Proficiency (LOEP) test, which is activated during the testing session when students answer predetermined reading and grammar questions incorrectly. The results will indicate whether placement in Basic Skills courses or American Language courses is more appropriate. The cost for this test is $3.00 per student for the LOEP). It is estimated that 300 students will take this test in each of the two academic years for the project, for a total of $900.00 for the testing instrument.

Thus, the phases are as follows:

1) Basic Skills / CELT Test
2) Analysis of the Basic Skills Result for ESL students
3) Retest of these students using the LOEP test or another testing instrument
4) Replacement

4.1.1 The Testing Lab

The College has designated Computer Lab L128 for use as a testing center. For the purposes of the project, the Center will be equipped with modular dividers to provide twenty workstations so

that students may take the LOEP test on computer for immediate scoring. Other testing instruments for the target population will be piloted in the Testing Center. Currently, the room is equipped with twenty computers set up as a classroom. Part of the first component of the project is the design and arrangement of a computerized testing facility. This includes the purchase of dividers to separate workstations, computer tables, and chairs. In this component faculty will also analyze other testing instruments and placement formulae, and study the correlation between initial placement, progress through the program, and student success.

4.2 ORIENTATION AND DISSEMINATION OF INFORMATION

A special orientation session would be scheduled for the target population in order to explain the educational path and options before them. The purpose of the orientation is to create a comfortable and non-threatening situation for incoming international students and to prepare them to take the placement test as a preliminary to registration.

The orientation component will consist of the following segments:

- The translation of the essential material on the program, testing, and the registration process.
- Advertising the program to area newspapers, including ones read in other languages by the target population and their families.
- Planning, scripting, videotaping, and recording an informative sixty minute orientation.
- Planning a tour of Bergen Community College's special facilities for language minority students (the Computer Lab, the Internet Lab, the English Language Resource Center).
- The preparation of a computer-based orientation for international students. This version will be made available on the homepage of Bergen Community College on the Internet.

4.2.1 Translation of Information Material

The first part of the orientation component involves the translation of the American Language Brochure, the Counseling summary, a one-page information sheet on the CELT and NJBST into the key languages represented by the target population of language minority students: Korean, Spanish, Japanese, Polish, and Russian. These materials will then be printed and mailed to prospective students in the target population who have expressed interest in the school. This is especially important because since these students are recent high school graduates, they usually live with their parents or other close relatives who do not speak or read English. The materials prepared in their native language will thus be a powerful tool in helping them to understand the program and the services available to them at Bergen.

4.2.2 Preparation of an Advertisement in English and other Languages

The second part of the orientation component is the preparation of an advertisement in English and Korean, Spanish, Japanese, Polish, and Russian for insertion in newspapers in Bergen County. The advertisement would have two objectives: a) to advise the community of the specific orientation program; and b) to inform language minority students of the American Language Program at Bergen. There would be a return form to request further information and to register for the orientation.

4.2.3 Planning, Scripting, Videotaping, and Recording the Orientation

A sixty-minute orientation will be planned and scripted, through involvement of the American Language Program Coordinator, the level coordinators, the Speech coordinators, international student counselors, the Director of Registration, the Director of Testing, the Director of Financial Aid, and representatives from the International Club. The orientation will focus on disseminating information on the levels of the American Language Program, the specific courses offered, the path to College-level courses, and the facilities and services available to language minority students. The planning, coordination, and scripting of the orientation will be done during the Fall 1998 semester, and implemented in January 1999 for the Spring 1999 semester. The first orientation session to be held in January 1999 will be videotaped and recorded. Students will be provided with College folders and information materials. The video and audio tapes will be copied and distributed in the following manner: copies in the Bergen Community College library, counseling office, registration office, the office of the American Language Program Coordinator, and additional copies to be sent to the municipal libraries of communities with large language minority populations (Hackensack, Fort Lee, Palisades Park, Wallington, etc.)

4.3 THE ENGLISH LANGUAGE RESOURCE CENTER: SUPPLEMENTAL INSTRUCTIONAL SUPPORT

The English Language Resource Center (ELRC) provides supplemental instructional support in English to language minority students. The project would devise and implement a support program for the target population based on the experience gained through the successful implementation of similar services during the Vocational-Educational Grant. The services include individualized support in the following areas:

- Language Skill Assessment (Faculty)
- Stipulation of a study plan based on specific needs indicated by the assessment (Faculty)
- Consulting with faculty on student progress (Faculty and Professional Tutors)
- Tutoring and Mentoring (Peer Tutors and Professional Tutors)
- Monitoring progress (Faculty and Professional Tutors)

For the purposes of the project there shall be a distinction made between a professional tutor and peer tutors. *Professional tutors* are project personnel trained by faculty and the ELRC supervisor for the project to implement an individualized plan of study for language minority crossover students. They will essentially mentor the students throughout their participation in the ELRC. They will do the main tutoring and will work with peer tutors. Professional tutors will have the following responsibilities: liaison with faculty to monitor student progress, oversight and training of the tutors, and working closely with the students to make sure that the study plan devised by the faculty member and the student is implemented and followed. The ratio of professional tutors to the target population will be 1:15. Thus, based on a total of 75 students per semester, 5 professional tutors will be required each semester. A *peer tutor* is a student who is registered in American Language or college-level courses and is paid by the College Tutoring Center budget, for a maximum of 18 hours per week. The ratio of peer tutors to the target population will be 1:10. Thus, 8 peer tutors will be required each semester.

4.3.1 Language Skill Assessment

A thirty-minute interview between the student and a faculty member will be used to assess individual language skills and areas which require attention. This interview will consist of an oral segment, an analysis of reading and writing ability, as well as a discussion of the student's academic plans and goals. The interview will be standardized. Preparation of the standard language skill assessment will be a fundamental part of the project, but it will be based on procedures and materials already in use and tailored for this population.

4.3.2 Stipulation of a study plan based on specific needs determined by the assessment

A study plan will be composed by the faculty member and the student to address specific needs. In collaboration with the professional tutor, the student will schedule tutoring times during the week and a program to be followed. The study plan tailored to the students' individual needs will direct them to utilize resources available in the ELRC: computer-assisted instruction in language skills, video tape programs in study skills development and note taking, as well as peer tutoring. The frequency and schedule of visits to the ELRC will be set up in the study plan.

4.3.3 Consulting with faculty on Student Performance and Monitoring Progress

Faculty members working with professional tutors will consult with professors who have the target population students in their classes. A written instrument will be prepared to allow faculty members to write their comments about student progress, accompanied, if needed, by personal discussions with the professor. Students will therefore receive constant feedback about their work. Student progress will be monitored by the faculty member by consulting with the professional tutor and the student. Progress assessment will be made once per month. If necessary, the study plan, tutoring direction, and tutoring hours will be adjusted according to the changing needs of the student.

At specific intervals throughout the semester, the faculty member will review the records kept by the professional tutor and peer tutors of work accomplished by the student. Conferences will be held to evaluate the instructional plan and to discuss changes if needed.

ELRC personnel will notify student's instructors regarding the progress and consult with them if necessary regarding specific ways to help the student. The ELRC personnel will collaborate with instructors in the EBS and WR065 course to determine ways to best support strengthening of language skills for college success.

4.3.4 Tutoring and Mentoring

The language minority students chosen to participate in the project will meet on a regular basis with professional and peer tutors for learning enrichment. Uusing a tutor:student ratio of 1:8, the implementation of the would enable the Center to remain open 53 hours per week (35 currently, with the addition of 18 hours for the half-time supervisor).

4.3.5 Supervisory Personnel

An important component in the project is to hire another supervisor for the English Language Resource Center. Currently, there is one supervisor paid by the College with a thirty-five hour weekly schedule. An additional half-time supervisor would enable the Center to remain open

evening and weekend hours. The Project supervisor would work directly with the faculty, professional tutors, and peer tutors in managing the services offered by the ELRC. The half-time ELRC supervisor would work closely with the Grant Co-Directors on all aspects of this component of the project. The Project Supervisor is a part-time project employee who will be part of the expanded use of the ELRC. To accommodate the project, it will be necessary to expand hours of operation of the center and to provide supervision during the extra hours.

The full-time ELRC Supervisor, a college employee, working with the Project Supervisor and the Co-Directors, will coordinate the integration of the activities of the grant project within the normal operations of the ELRC. The two supervisors will determine operating schedules and space allocation. They will establish a system for recording student participation in activities of the ELRC, making it possible to monitor student progress. This includes utilizing the existing ELRC data base for record keeping. The two supervisors will be responsible for managing instructional resources, including integrating new software into the computer system design.

4.4 COURSE DEVELOPMENT AND CUSTOMIZATION

A review of English Basic Skills (EBS) curriculum and instruction will be conducted in order to determine ways to adapt the existing courses to the needs of the target population. Information will be gathered from EBS instructors regarding the specific instructional needs of these students and the difficulties instructors have been encountering in the classroom.

In conjunction with the English Basic Skills Coordinator, pedagogical strategies will be devised for use in particular sections of WR016-17 or WR023-24 designated for the target population of language minority students. Special materials for teaching reading, writing, and study skills will be obtained, adapted, and/or prepared.

After the analysis of the curriculum and the implementation of revised methods and materials, training sessions will be arranged for EBS instructors. Focus will be paid to those instructors assigned to these specially-designated sections, but training of all those teaching in the EBS is also envisioned through a more general workshop and presentation. Throughout the semester, consultations with the instructors of the EBS course designated for the language minority students will be held to support the implementation of the new instructional design.

A new syllabus will also be designed for WRO45, WR055, and most importantly WR065 (the directed studies class at the highest level) to accommodate language minority students taking credit courses but still requiring support in reading, writing, and study skills. The syllabus will include content-based language learning activities in subjects in general ed courses.

4.5 TRACKING

The data collection and analysis component will provide educational and linguistic profiles of the target population, interview results, and their academic progress by tracking them as they proceed through their academic path.

Part of the tracking segment of the project is to compare two groups of students: the target population of the project, the language minority students who choose to take full advantage of the services and academic enrichment provided against those who do not. The grades in the specific language courses will be analyzed and compared, and the grades earned in other courses will also be examined.

RETENTION STRATEGIES FOR WOMEN IN THE PHYSICAL SCIENCES AT BERGEN COMMUNITY COLLEGE

SUBMITTED BY
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PRINCETON MID-CAREER FELLOWSHIP PROGRAM
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FOREWORD

Even though women make up the majority of the population in the United States, and are entering the workforce in greater numbers, their representation in the science and engineering workplace still remains small.

Women have traditionally been excluded from science, especially at the policy making levels, so that the science that is now taught, the way it is practised, and the way that it is allowed to progress, has been determined by men.

Women entering the science field face challenges in landing prestigious jobs with the same salaries as men, and in obtaining promotions and important projects. Feelings of isolation, conflicting emotions about child rearing and their careers, and the pressure to perform even better than men simply to justify their positions, result in some women abandonning science.

Changes in the teaching and practising of science can take place only when women enter the workplace in such numbers that they are no longer perceived to be "non-traditional".

At Bergen Community College, for the spring 1998 semester, 4% of the total female population registered for chemistry and physics courses. For the period 1990-7, only 4% of the matriculated chemistry and physics female students actually graduated

The use of various teaching techniques to address the different learning styles of students, extra problem solving sessions, extremely well organized lectures that simplify the chemical terminology, mentoring and increased encouragement from faculty, and networking through a science organization are some of the intervention strategies that may lead to the greater success of women in science courses. Increasing success would lead to confidence building and a greater interest for the subject. This will result in fewer women leaving the field

REPRESENTATION OF WOMEN IN SCIENCE

Women make up 51% of the United States population, and an increasing number of them are now working outside of the home. For the period 1996-2006, it is projected that women will constitute 49.6% of all entrants to the labor force. During this period, there will be a growing need for skilled workers and intellectual talent.

Presently, women make up 48% of the employed labor force in the United States. However, women constitute only 22% of all working scientists and engineers. In recent years, women have been receiving close to 50% of all degrees granted. However, the number of them receiving degrees in the physical sciences and engineering, has been much smaller. Male scientists tend to concentrate in the physical sciences and engineering, while their female counterparts tend to concentrate in psychology, and the life and social sciences.

In 1993, women earned 30% of the total number of science and engineering doctorates awarded; 21% of the degrees in the physical sciences, 61% in psychology, 40% in the biological sciences and 9% in engineering. At the master's level, women earned 39% of the awarded science and engineering degrees; 28% of the degrees in the physical sciences, 51% in the biological sciences, 73% in psychology and 15% in engineering. At the bachelor's level in 1993, women earned more than half of the total number of degrees awarded. Of this number, 31% were in science and engineering. The proportions again varied according to the field: 73% of the degrees in psychology, 52% in the biological sciences and 16% in engineering.

For 1996, in chemistry, women earned 43% of the bachelor's degrees, 44% of the master's degrees and 31% of the PhD's. For chemical engineering, women earned 33% of the degrees at the bachelor's level, 23% of the degrees at the master's level and 18% of the degrees at the PhD level.

Since 1991, international scientists have accounted for more than one half of all the mathematics and engineering graduate school students in institutions in the United States. In addition, fully trained international scientists have been immigrating to the United States with permanent visas from Asia and Eastern bloc countries at increasing rates. For example, for 1991 and 1992, they numbered 22,900.

Overall, there has been a decreasing percent of US citizens receiving degrees at all levels in science and engineering and there are concerns that the supply of US-citizen scientists and engineers will not be sufficient to meet the demands of US companies, educational institutions and the government in the near future.

Even though the percentages of women in the science and engineering workforce have been increasing, their numbers still remain low. In 1993, women made up 9% of physicists, 16% of the physical scientists, and 4% of the engineers at the doctorate level , in the scientific workforce.

Two year colleges enroll 46% of the students entering higher education as first year students. They also enroll 50% of the students from underrepresented minority groups entering college.

About 725 of the nation's two year colleges offer engineering and technology classes, and about 500 offer science technology courses. In 1991 and 1992, one third of the total science and engineering graduates at the bachelor's level had also attended community colleges, and about 20% of that group had earned associate degrees. More of the female baccalaurates had attended a community college than men.

Women scientists and engineers are more likely to be employed in academia, but they represent only 24% of the science and engineering faculty. They are more likely than men to be employed in two year schools, to teach part-time and to have fewer PhD's. They are less likely than men to chair departments, or to hold highly ranked positions in colleges and universities.

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THE RATIONALE FOR INCLUDING WOMEN IN SCIENCE

Women have always practised science, but their contributions have been, for the most part, challenged, ignored or marginalized. Women have been excluded from established scientific circles, a practise that is still evident. For example, of the 1634 elected members of the National Academy of Science, 70 are women, and only one is a chemist.

Men, having dominated science for so long, have established the rules of the profession, have defined its culture and have determined the way science should be taught. Since women have been excluded from this culture for such a long time, they have had no influence in determining how science is practised, or taught, or how it advances. They have been entering, learning, and working in a system that was created and dominated by men.

Among physical scientists and engineers, gender differences tend to be emphasized because of the low ratio of women to men. This ratio becomes even lower as women advance through their careers. The majority male group tends to stress its dominance of the culture and emphasizes its difference from the "token" women. The minority member is then placed under greater stresses, is under greater pressure to perform, and is usually judged by higher standards of performance. "Token" women are often expected to assume trivial roles which are often exaggerated. These increased stresses often result in their departure from the field.

In the classroom, too, when female students are enrolled in majors like chemistry and physics, in which they are viewed as non-traditional students, they experience pressures that lead to isolation and their dropping out of the major. In fact, female college science students tend to drop their science courses at greater rates than those of their male counterparts even though they may have obtained better grades. In addition, many women perceive the teaching methods used in undergraduate courses as being uncaring and impersonal.

Women and men practise science differently. In their practice of science, men tend to be competitive and domineering, while women appear to prefer a more collaborative approach. More women in the workplace will change the way science is practised and taught. With more diversity, the workplace will become more resilient.

In the physical sciences, women are especially underrepresented in the decision making levels of the profession where they can have a more direct influence over policies that determine the use of technology for use in war, destruction, environmental degradation and the health of their children. To understand and develop policies about the use of technology, women must acquire the necessary science skills.

In recent years, affirmative action policies have been developed to ensure that the best candidate gets the job, even if that candidate is a woman.

Since the population is made up of more women than men, if more women were to study science, an informed scientifically literate society would develop.

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SOME OBSTACLES FACING WOMEN IN SCIENCE

Many women prefer not to study science or to seek jobs in science because they forsee several obstacles on their way to success. Others will never enter the field because of the negative impressions that they have of the field.

Many women fear that, having graduated from college, landing a prestigious, well paying, scientific job may be difficult, and that the salary may not be as high as their male colleagues. Fears of the "glass ceiling", isolation, and smaller chances of being promoted or being given important projects, may also be deciding factors in abandoning science. In addition, the need for continued education, and the salary compared to the many years of training, may not be as attractive as that of other careers.

The years in which a woman must devote her greatest efforts to a science career coincide with her child bearing years. Many women feel torn between the need to spend the necessary long hours in research, and the need to care for young children.

Some parents and teachers discourage girls from doing science by implying that science is "difficult", that girls are "not good" in science, or that science is a "male thing". In the high schools, many girls, not wishing to appear too smart, deliberately do not push themselves to excel in science.

The media often ridicules scientists, showing them as "mad", and "evil". In general, women in the media are unattractive, unmarried, and are technicians. TV female scientists are always young and never make decisions. This negative portrayal of scientists by the media results in the lack of an attraction for the field by some women.

While men experience an increase in self esteem in college, that of a woman tends to decrease, especially during the sophomore year. The feelings of pressure and isolation arising from being in the minority group may result in despair and loss of self respect. This, as well as a woman's tendency to attribute failure to herself, and success to luck, may cause her to leave the field, despite having achieved some success.

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SCIENCE AT BERGEN COMMUNITY COLLEGE

In the physical sciences, Bergen Community College offers the Associate in Science degree in chemistry, physics and engineering science. For the chemistry major, general chemistry 1 and 2 and organic chemistry are required. For the physics and engineering options, physics 1, 2 and 3 as well as engineering mechanics are required. The Introduction to Chemistry course for students who have never taken chemistry before, the College Chemistry course for nursing students, and the Basic Biochemistry course for dental hygienists, are all regularly offered. The Introduction to Chemistry, and the Introduction to Physics courses, with their general education designations, are used by many students as their Natural Science elective courses.

In chemistry and physics, there are seven eminently qualified faculty on tenured/tenure track lines; four females and one male in chemistry, and two males in physics. The four tenured faculty have extensive teaching experiences. All seven faculty engage in scholarly work, serve on committees, and some have assumed some administrative duties. New technology has been introduced as the faculty continually revise the curriculum to keep current with the needs of the students and the workplace. The labs. are well equipped with state of the art instruments.

For the third semester, the physical sciences faculty, in an effort to increase retention, have been holding extra office hours in a centralized location, to accomodate the needs of any physics or chemistry student enrolled at the school. Recently, extra problem solving sessions have been introduced. In addition, peer tutoring is available at the College's tutoring center.

The College has seen a decrease in enrollment in some areas in recent years. Decreases in the physics and chemistry enrollments are also evident. For spring 1998, a total of 10,942 students enrolled; 2198 full-time and 3738 part-time students. Women enrolled in chemistry account for 4% of all female students enrolled at the College (Table I). For physics, this number drops to 0.9% (Table II).

TABLE I
CHEMISTRY ENROLLMENT, SPRING 1998

Course	Men	Women
Introduction to Chemistry	82	98
College Chemistry	5	12
Gen. Chem 1, lecture	56	46
Gen. Chem 1, lab	49	38
Gen. Chem 2, lecture	35	17
Gen. Chem 2, lab.	28	19
Organic Chemistry	11	8
Total	266	238

TABLE II
PHYSICS ENROLLMENT, SPRING 1998

Course	men	Women
Intro. to Physics	46	25
Gen. Physics 1	10	3
Gen. Physics 2	3	11
Physics 1	16	4
Physics 2	18	5
Engineering Mechanics	9	3
Total	102	51

In chemistry, for the period 1990-7, of the 154 men and 88 women that were matriculated, 9 men and 3 women actually graduated. Over this period, the number of matriculated male students had doubled, while the number of women had tripled (Table III).

TABLE III
MATRICULATION AND GRADUATION DATA FOR CHEMISTRY
1990-1997

Chemistry Enrollment
Fall 1990-Fall 1997

Fall	Male	Female	Total
1990	11	7	18
1991	10	4	14
1992	19	5	24
1993	17	4	21
Fall	27	13	40
1995	24	17	41
1996	27	18	45
1997	19	20	39
Total	154	88	242

Chemistry Graduates
Fall 1990-Fall 1997

Graduate	Male	Female	Total
1990	1	0	1
1991	1	0	1
1992	1	1	2
1993	0	0	0
1994	1	0	1
1995	1	0	1
1996	2	2	4
1997	2	0	2
Total	9	3	12

In physics, for the period 1990-7, 45 men and 9 women had matriculated. Of these students, 3 men and 1 woman graduated. Over this eight year period, the number of matriculated men increased by a factor of five, while there was no matriculated female since 1993 (Table IV).

TABLE IV
MATRICULATION AND GRADUATION DATA FOR PHYSICS
1990-1997

Physics Enrollment
Fall 1990-Fall 1997

Fall	Male	Female	Total
1990	2	2	4
1991	3	4	7
1992	9	2	11
1993	6	1	7
1994	4	0	4
1995	5	0	5
1996	6	0	6
1997	10	0	10
Total	45	9	54

Physics Graduates
1990-1997

Graduate	Male	Female	Total
1990	1	0	1
1991	1	0	1
1992	1	0	1
1993	0	1	1
1994	0	0	0
1995	0	0	0
1996	0	0	0
1997	0	0	0
Total	3	1	4

Sixty two (62) women enrolled in the general chemistry and physics courses, in organic chemistry, in the physics 1, 2 and 3 and engineering mechanics courses, participated in a science survey during February, 1998. Students were asked to list other science courses that they had taken, to indicate their major and to identify some reasons for choosing or avoiding science. Students were also asked to comment on their high school experiences, and the support they received from their families and friends. Students were also asked to suggest some ways for the improvement of teaching that would make science less formidable.

Of the women surveyed, 92% had taken other science courses, but only 55% had decided to choose a science major. Of the 55%, 65% were planning to continue in science; 15% in chemistry; 12% in engineering and 73% in the biological sciences. Thirty two percent (32%) of the biology majors planned to attend medical school. The women who did not choose a science major were fulfilling science requirements for their majors, predominantly in the health science field. The science majors chose

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science because of their own interest and fascination with the subject and because they had experienced some success in previous science courses. Those who did not choose science reported fewer successes in these courses which they perceived to be long and difficult.

In high school, 63% of the respondents had positive experiences based on their success in science courses, support and encouragement from teachers, and their own interest. The other 37% of women thought that poor grades, difficult classes, inability to cope with the mathematics aspect of the courses,and the lack of any encouragement to study science, as factors in their decisions not to pursue science careers.

In their comments about teaching methods, most of the women preferred the very organized lecture format, with detailed explanations and the use of visual aids. More problem solving, group work, real life applications, the explanation of scientific terms in any easy to follow manner, and more student-teacher interraction in the classroom, were perceived by them as factors that would contribute to their greater success.

More women, 74%, described supporting and collaborative relationships with other women in the classroom. However, 34% of the women experienced disrespect and other negative reactions in their relationships with the male students in the classroom.

Positive reactions and support for their dedication to science, were received from family, friends and spouses by 77% of the respondents. Fewer women, 47%, felt that they had received the same encouragement from their professors at the College.

Only 27% of the women surveyed thought that they would experience discrimination in landing a job in science. More women, 47%, felt that they would experience discrimination on the job in terms of salaries and opportunities, and by not being taken seriously.

Almost all of the women saw a correlation between the science they were studying and real life, and were interested in learning more about the contributions made by women to science.

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RETENTION STRATEGIES FOR WOMEN IN SCIENCE AT BERGEN COMMUNITY COLLEGE

Only a small number of the total number of women enrolled at Bergen Community College register for chemistry and physics courses. An even smaller number of these women plan to major in science. A classroom atmosphere that is female friendly, a curriculum that includes women and their various learning styles, and mentoring by faculty, will all result in the development of many women's enthusiasm for science. Their interest for the subject and the confidence that they can succeed in science, would result in many more women remaining in the field, long after leaving the College. In addition, more women would be attracted to the science programs at Bergen Community College, as anecdotes of the positive experiences that other women have enjoyed, are described to family and friends. It should be also emphasized that any well evaluated programs that effect changes in the curriculum or in teaching strategies will benefit all students.

CURRICULA AND THE CLASSROOM

1 Develop curricula that will acknowledge the contributions of all scientists, both male and female of diverse racial/ethnic backgrounds and cultures. Include the names of women scientists who have made important discoveries. Emphasize that many ordinary scientists make valuable contributions to the discipline, but do not achieve fame, or win prestigious prizes. Some women feel inadequate in becoming scientists when confronted with role models of only famous scientists. Many women, both at the graduate and undergraduate level work in the laboratories of Nobel Laureates and contribute to the work that brings the mentor the recognition. The examples used should relate to the broader audience as well.

2 Use a range of teaching methods to accomodate students with different learning styles. For example, demonstrations, molecular models, videos, computer simulations and multimedia, collaborative exercises, journal writing, writing out their thought processes as they solve a problem, and library projects may be used.

3 Encourage women to work with each other especially when working with lab equipment or computers. In male-female partnerships, frequently, the male works with the equipment while the female writes down the observations. She therefore gains no experience with the equipment and becomes inadequately prepared for her next science course. Women tend to adopt a more collaborative approach to problem solving. In group work, do not assign only one woman to each group since being considered as the "other" often results in the woman not participating to the fullest extent.

4 Include chemistry and physics courses in the Honors program and encourage more women to enroll for these courses.

5 Consider the woman's point of view just as seriously as the man's. Incorporate her personal experiences as a part of class discussions to introduce new perspectives on old issues.

6 Do not tolerate the use of sexist language in the classroom.

7 Encourage women to be more assertive, and to ask more questions. Engage them in more discussions.

8 Recognize that older returning women tend to feel isolated both from the younger students, and from the faculty to whom they may be closer in age. Encourage more interraction with this group.

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9 Use introductory courses to recruit rather than to weed out women.

10 Women are more likely to understand and be interested in solving problems that do not involve guns or violence because they are perturbed by the ways science has been used against the environment and humans. Instead , discuss the practical uses for which scientific discovenes have been used to improve people's lives, for example, the use of chemistry for synthesizing medicines and new matenals. The relationship of science to other disciplines should be also mentioned, for example, the importance of chemistry to microbiology.

11 Recognize that the language of chemistry is unique and explain the meaning of the chemical terms in the simplest possible manner.

12 Educational goals that stress ethics, general education, and communication skills are more important to women than to men. Accomplish this by including journal writing or library research projects.

13 Emphasize some of the positive aspects of studying science at Bergen Community College. Small classes result in more individualized attention. Professors teach both lecture and lab. classes. Role models can be found in the faculty who have balanced a career and marriage, and in some cases, families. The faculty are all enthusiastic about their chemistry, are available, approachable, easy to talk to, patient, and are willing to spend their time with students.

B MENTORING

1 Most people who have succeeded in science have had mentors. A mentoring program should be started to help students achieve self confidence, academic success and their personal goals. A successful program will result only if all faculty, counselors and administrators are committed to providing students with a meaningful learning expenence.

2 A science club, a women's center, or a local chapter of the Association for Women in Science would provide support and networking opportunities. Topics and issues critical to women's professional development can be addressed. Options to women who never considered science may be introduced through role models, speakers, and career development workshops. A big sister program can be started in which upper level students can share their expenences of courses and instructors with lower level students. Travel awards, if possible, may be provided to attend conferences, where students can network, share information, and develop employent contacts.

3 Encourage women to use electronic communication to establish and maintain contact with their professors and other women, to reduce feelings of isolation.

4 Mentors should address issues of marriage and family as they relate to career choices and the concerns of young women. Discuss some strategies for coping. Mention that women in science do not have to confine themselves to a lab, but may enter one of the numerous science related fields such as information science or scientific consulting.

5 Emphasize that science is 75% ambition and 25% ability. With dedication and hard work, women can succeed in science.

6 Many students leave science during the early college years when they have to decide on a possible major. Monitor their progress through interviews or surveys so that the appropriate intervention strategy may be applied.

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7 Women, fearing that they would break the expensive lab equipment, often show hesitation in using it. instructors should spend more time helping those students who are not confident with the manipulation of the equipment.

8 All faculty, both male and female, should develop, evaluate, and revise strategies for attracting and retaining women in science.

9 Stress the fact that the public attitude and that of the media would change only as more women understand science and begin to demand changes.

10 Emphasize that scientists are not all the same. Women can excel in science and still be very feminine.

C TUTORING

1 Encourage women to seek help from their professors and from the tutoring center. Small study groups to complete homework, and to study for exams have been found to be very useful.

2 The College should establish a physical sciences learning center where students can be tutored, and where they can engage in self tutoring using computer programs.

D OTHER

1 More women should be encouraged to apply for financial aid. Scholarship sources, grants and summer internships that target women in science should be researched and announced to all women. Faculty should also inform students of any job opportunities of which they are aware, and support the students' applications with recommendation letters.

2 The top level administrators at the College, who are not science majors, should be alerted to the special problems encountered by women in science.

3 Special projects outlining the contribution that women have made to science should be undertaken, for example, during Women's History Month.

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Bonnie Dimun
Mid-Career Fellowship Seminar
Professor Theodore Rabb
Winter 1997-98

EDUCATIONAL MARKETING:
AN ESSENTIAL TOOL FOR MANAGING CHANGE

The purpose of this paper is to focus on the changes affecting the management, leadership, and effectiveness of community colleges. Change is the premise of this paper... The last thirty years of growth has led to community colleges serving more enrollees than all four-year colleges and universities combined. The years of remarkable growth provided opportunities and access for women, racial and ethnic minorities, low-income students and older part-time students to take advantage of educational access. Educational leaders of the community college system were architects and builders of access and promise. They created institutions that, by their very mission, were open to accept and embrace the large numbers of students who would take advantage of the "open door" philosophy.

Over the years, we became aware of the factors challenging our positive growth and threatened cyclical decline in enrollments. Recently, we have become even more aware of a new reality. Although we claimed we knew and understood the impact of demographic shifts, economic trends, and competition from the other schools as well as business and industry, the steps necessary to be proactive, in light of all the data, were rarely implemented in a strategic manner.

Faced with the reality of shrinking budgets, rapidly changing social needs, political climate, and ever more intense public scrutiny, today's non-profit institutions are finding that it's not enough to simply update a mission statement or patch over a list of out dated goals. They're discovering that survival now depends on the ability to effect real change the same way corporate giants such as IBM, GM, and Hewlett Packard have, by reinventing themselves from the ground up. In other words, through reengineering. Few community college leaders have had the experience in managing the impact of a serious downtum. Contingency planning that included steps to address these issues were virtually ignored. Unfortunately, many institutional leaders were operating under the assumption that they were insulated from certain realities so they deluded themselves by believing declining cycles were temporary and would again tum upward. Very often, trends beget complacency and they became driven by that trend rather than managing and charting a new direction.

Institutions are indeed fortunate when their Board of Trustees understands these difficult times. Enlightened trustees provide and support planning techniques to manage the challenges that lie ahead. Clearly, strategic planning is the course of action for shaping an institution's future.

We must have leadership capable of bringing new vision to our institutions. Collectively, we have recognized the need to address effective strategies to manage our institutions and thus creating a professional approach to our enrollment management. The following concepts are the preface to a comprehensive plan to demonstrate a new vision for managing and marketing higher education.

Concept 1: Develop a competitive, entrepreneurial spirit in our mission.
Concept 2: Recognize the mission is to serve the educational needs of our community.
Concept 3: Make no assumptions! Research the marketplace.
Concept 4: Define everyone's role and determine a prescription for action and accountability.
Concept 5: Manage the institution with a strategic objective.

Now is the time for us to view higher education in new terms. As we move into the new millennium, institutions of higher education will have to market themselves more effectively and efficiently than ever before. Issues like public perception, economics, politics, funding loss from Federal, State and other sources, and many other factors will force our institutions to market themselves with much greater emphasis. Due to the issues expressed above, higher education is paying greater attention to the concept of institutional advancement influenced by strategic marketing. The reality of aggressively pursuing the customer (the student) versus complacency has finally come into focus. Many institutions are recognizing the importance of advancement and are becoming proactive by reorganizing institutional priorities, structures, and resources.

A trend has emerged where a Vice President for Advancement, or a similar position, is now an essential part of the executive team. The scope, impact, and responsibilities of that job include strategic planning, marketing, student recruitment, public relations, publications, alumni, institutional fundraising, and governmental relations. This centralized structure creates new arenas for teamwork and cooperation. The consolidated approach focuses the overall goals for the institution creating a communicative environment rather than an operation which functions in an information-free vacuum. A decentralized approach very often results in deficiencies including lack of teamwork, duplication of effort, materials not being coordinated, standards for graphics and editorial being compromised, as well as serious issues of turf and power play. This centralized structure indicates the new sense of commitment and urgency to be proactive and understand some of the major issues related to advancing the institution.

Having one empowered person with responsibility to coordinate the many facets of these critical functions places the importance of good communication on a higher plane.

The image of the institution can be and often is at stake. Lack of well focused communication can potentially create a loss of identity, confusion, factual misrepresentation, lack of accountability, and potentially misguided expenditures particularly when resources are limited. The need for strong leadership is essential to the advancement process.

Many college board members look to corporate methodologies to stress the importance of marketing and market share analysis to manage the college and utilize sound and proven principles. This entrepreneurial spirit is finally beginning to seep into higher education. In the past, higher education was complacent and willing to accept established traditions. The educational sector was indifferent to the competitive spirit and lacked a strategic, conceptual or business focus.

According to Alcaste Pappas, President of Pappas Consulting, the fundamental tenets that are expounded in the management texts for the for-profit or corporate sector are typically applicable to the nonprofit, although some fundamental attributes and operating principles distinguish the sectors. The most fundamental is the mission-based philosophy of the non-profits, rather than bottom-line focus of the for profit organizations. Although the nonprofit must generate sufficient resources to cover its operating costs and create reserves for its future, its purpose is not directed to make a profit. Rather, it exists to do good works and enable society to be a better place than it would be if its entire focus were monetary. Although, non-profits are subject to the vicissitudes of funding, financial support, market positions, and strength of leadership just as their for-profit counterparts, the publicly supported, comprehensive community college is designed to serve all those who can benefit from post-secondary learning opportunities. The open admission policies of the community college sector are meant to provide affordable, accessible and quality education to all residents of a given county. The open admission policy was meant to embrace all educational needs without selectivity or elitism. This open-mission policy created institutions that were to be responsive to the educational needs of the county residents. The challenge for each college to understand the demographics and ever-changing profile of the county in which they are located thus serving the comprehensive needs of the county population.

In addition to serving the educational needs of our full and part-time students, many services are provided to enhance opportunities for our diverse population. English as a Second Language programs fill a huge need for a vast numbers of county residents,

, while a stunning number of county residents require remedial programs to give them the opportunity promised by the "open door" policy. Honor programs are offered at many of our institutions to serve the gifted student. Whether the student is simply taking a class, seeking a terminal degree or certificate, or is earning some credits before transferring to another school, the mission of the community college is to serve the disparate educational needs and desires of a given county's residents. Business and industry are provided with customized training to meet their ever-changing needs in the employment arena. Marketing, when viewed in a broad definition of 'defining a need and than filling it' has to involve such college-wide areas as curriculum, services, retention and research–not just promotion and recruitment–that effective marketing becomes everybody's business and requires a team approach.

The leadership and management of higher education have historically been from the academic community. We have, however, realized that it is preferable to have professionals from the business community to lead our finance and human resource departments. Exposure to and experience in the concepts of business, economics, marketing, finance, and human relations will become more critical for our future leaders and senior managers if educational institutions are to compete in the marketplace. The president of each educational institution must possess the skills and understanding of the basics of managing the "business of education." Corporate mindset and ability to think strategically must be incorporated into the educational thought process for effective leadership. The success of our institutions requires today's college presidents to have the leadership qualities of industry CEO's. Whereas the leaders of today's faculty must also possess greater business acumen, the first and foremost responsibility will still be scholarship for the academic disciplines of the institution. The senior leadership of our community colleges needs to position the institution as a competitive provider of services, be they traditional educational goals or the unique needs of local employers. The services provided by community colleges are educational, putting the educational industry on a par with doctors, lawyers, accountants or any other service professionals.

Although marketing has had a long history in business and industry, it is only in the last few years that the concept marketing reached higher education with gusto. Marketing our institutions requires analysis, planning, and the implementation of programs designed to bring about desired communication with potential customers from designated markets. This communication is directed at target markets (groups of pre-identified people) for the purpose of achieving the organizational goals. Marketing relies heavily on the organization's ability to

prepare and present its product or services so that they answer the needs and wants of these target markets.

Market research helps to cut through the clutter and chaos to answer basic questions that enable us to carry out our mission. Marketing can make the difference between success and failure. Marketing concepts need to be put into action in order to see the results. All the strategy, research, and planning are nothing more than exercise if they are not put into action in an effective manner. Implementation is the execution of a well thought-out action plan. Be aware, however, that marketing poor service defeats the effort. The service provided must justify marketing efforts.

Until recently, institutions of higher education have marketed themselves by assumption methodology, or the "inside-out" theory. Bob Topor, in his book "Navel Gazing," strongly suggests a reversal of this methodology, which basically says we determine internally by assumption who are our "customers", what they want, and what they need. Topor believes that is the basic problem in educational marketing. The need is to shift the paradigm and focus our attention on the "outside in" concept. The only way to execute this concept is to start with market research, which provides qualitative as well as quantitative viewpoints, and perspectives that answer the questions of who are our target audiences what do they want, need, and what they think of us versus our competition. What seminars, courses, materials, etc. can we offer our target audience to best serve them and distinguish our college from the competition? In the absence of this research, we are left to try to be "all things to all people."

"Be all things to all people. Among the most cogent tidbits we would proffers is "focus, focus, focus. It is no longer possible or wise to attempt to be all things to all people. During the planning process, conscious decision making needs to take place about which programs and services require investment, which need to be maintained, and which need to be divested or eliminated. When a nonprofit has programs with low market attractiveness or demand and the programs are not particularly relevant to the core mission, such programs are primary targets for elimination." According to Pappas in her book entitled Reengineering Your Nonprofit Organization.

In an age of specialization, people need compelling reasons to choose one school rather than another. Precisely, why the shift in understanding that the consumer needs to be our focus is an essential element of a marketing strategy for an institution. "Pressed with increasing competition from other colleges, universities, online trainers, and local workshop leaders, community colleges are taking a fresh look at their students. What they're seeing are

customers who have the choice to go elsewhere for education and training. And they're responding to this new vision by catering to those customers' demands for less bureaucracy and more convenience." We're simply in an age of consumerism", said Al Lorenzo, president of Macomb Community College in Warren, Michigan. 'Regardless of whether it's buying clothing, automobiles, or education, there is this pervasive move toward people expecting to be treated in a certain way. It's a carryover.' "Using a word like 'consumer' to describe a college student makes traditional academics cringe. 'The words "customer service" are usually a turnoff to faculty and staff because they're terms used in business,' Kanter explained. 'It kind of ignores the educational philosophy that the colleges were built upon.' "But moving toward that mindset, said Linda Thor, president of Rio Salado Community College in Tempe, Arizona, is a matter of survival for community colleges." Community colleges don't have a monopoly, 'so we have to add value to what we provide to the students. 'They have more than one place to get what they want.' And when they don't get what they want from their local community college,' she added, 'they vote with their feet.'" (Community College Journal) Dec.Jan. 1997-98

When trying to be all things to all people, we end up not being able to serve our potential customers because we simply don't know enough about what will drive their decision making. In the past we also did not differentiate ourselves enough to help in the decision making process. By absence of differentiation we ended up showing our similarities. If the consumer sees no difference, there is no good reason to select one institution over another. According to John Bakum, President of Middlesex County College in his State of the College Address August 97, "When we ask new students why they chose MCC, we do not often hear that it was because of a newspaper, radio or cable television advertisement. What we hear most often is that a friend or family member has a good experience here and made a positive recommendation. In short, good word-of-mouth advertising. And what promotes that? Positive experiences with the college. Those experiences may result from a helpful exchange with someone who answers the phone or someone who provides assistance in applying or registering. Good experiences may come from something as simple as giving a student directions to a building, or as complex and important as teaching them in the classroom. Overall, the nature of a student's interaction with the college determines the degree to which that student's experience at MCC leads to a positive or negative advertisement for MCC. It is the job of all of us to ensure the advertisement is positive." Further, Bakum states: "I believe we must all commit to stronger and, in some cases, more formal marketing and recruiting

initiatives. We must begin by accepting the very important fact that a student's decision to select and subsequently remain at MCC lies in our hands, all our hands."

Through effective market research we acquire relevant information to prepare for an effective marketing strategy and desired outcome. The image the institution maintains in the public eye is therefore crucial to understand. Market research gives us data on perception and identifies unmet needs and benchmarks for us our position relating to our competition. Every institution needs to define what they want to know in qualitative and quantitative terms. Therefore, the research is not boilerplate but designed for each institution in a boutique fashion. At Clarus Corporation, President Kathy Swanson has carved a niche in this field of market research for community colleges. Her consulting, research design, and implementation gave MCC the data needed to direct, reorganize, and focus their marketing efforts. As Dr. Swanson reiterates, each school has specific needs in terms of research required. A design should be tailored to fit the intention of each school. It is essential to identify the school's present position. What already exists—purpose, enrollment patterns, market share—helps determine the scope of the project.

Scans of the traditional and non-traditional student markets, employers, and businesses give insight to the development of marketing plans. In addition, the extensive and continuous review of mission helps with positioning in a competitive market place. Mission, as we see from successful corporations, is not carved in stone. The review process, even in financially solid companies, is perpetual so as not to lose market position. Moreover, the purpose of comprehensive market research is to identify new trends and products (i.e., educational courses) and offer customers an extensive menu. In higher education, we have seen some resistance to the formalization of mission review, specifically if the potential for significant change is deemed necessary. Our review of mission has had more to do with satisfying external accrediting bodies than the recognition that our mission may indeed need revision. Only when forced to examine our relevancy in the market do we "bite the bullet" and examine our purpose and intent in serving our client in an ever-changing environment.

Two examples come to mind regarding response to changes in the marketplace. Western Union once commanded an awesome share of the Telex market but they failed to maintain a focus on the changing environment affecting their services. ~~These~~ financially sound, major corporations sat by and witnessed huge market erosion as technology advanced via the fax machine and electronic mail. On the other hand, the airline industry, through very effective market research and strategy, successfully transitioned itself from a fully regulated

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industry to a competitive landscape. While the changes in government regulation lead to industry consolidation and the extinction of some airlines, certain astute airline managers became extremely successful by creating a niche that addressed their customers needs. Southwest Airlines, through an extensive market analysis, was able to out-fox the major airlines by identifying regional locations that had been underserved by the major air carriers. Thus, by listening to the customers, Southwest established a successful business in the shadows of the major airlines, like United and American.

Once a clear position is determined, the institution can begin to enhance its value in the educational marketplace by improving its position within a competitive sphere. It is essential to create niches or differences in which clarification for the potential customer is realized. Bob Topor states there is a close relationship of position, image, and perception. Every person involved in the institution contributes to its image and position in the marketplace. The ultimate positioning is expressed in the resumes success stories of the graduates. The goal is to build quality education. Thus, the students become the heart of the educational product.

The curriculum and scheduling must meet student needs, such as accelerated blocks for in-class and distance learning, and class time and location. We need to ask if we've updated our programs and courses to reflect changing job markets and new technologies. Moreover, we must make the hard decision to eliminate what's no longer relevant.

As is well known in marketing, the more focused the niche, the better possibility for success. Future institutions will strive to find narrow markets, abandoning past concepts of trying be everything to everybody through mass educational development and delivery. Just as large department stores have given way to specialized customer-sensitive boutiques, higher education will subdivide itself to be better able to serve new more discrete markets. These approaches will have significant impact on ways education is promoted. An example of this narrow niche focus is the success of DeVry and Chubb Business schools that focus largely on the needs of current environment, i.e., computer skills rather than attempting to combine offerings all in one package (i.e. course catalogs, schedules, or generic advertisements). Specific promotional efforts will be targeted to specific users in ways that are researched and developed for greater impact and success. This will be the impetus for the higher education paradigm shift from internal (so called "Navel Gazing") to external marketing focus.
If marketing is to work the following roadmap must be followed:

1) Market Research is required. While each institution needs to tailor fit their research to find the desired answers to targeted questions, the rule is no assumptions.

2) Organize personnel structure that is inclusive integrated and defines roles and responsibilities. Strong leadership.
3) Strategically plan.
4) Organizational Mission-Self-analysis- strengths, weaknesses, opportunities, threats.
5) Formalization of research results into a marketing/management plan.
6) Target Audience.
7) Position Institution.
8) Image Identification.
9) Identify Competition.
10) The 4P's: Product—Price—Place—Promotion.

The following marketing map taken from "Your Personal Guide to Marketing A Non-Profit" by Robert Topor is a good planning guide for institutions.

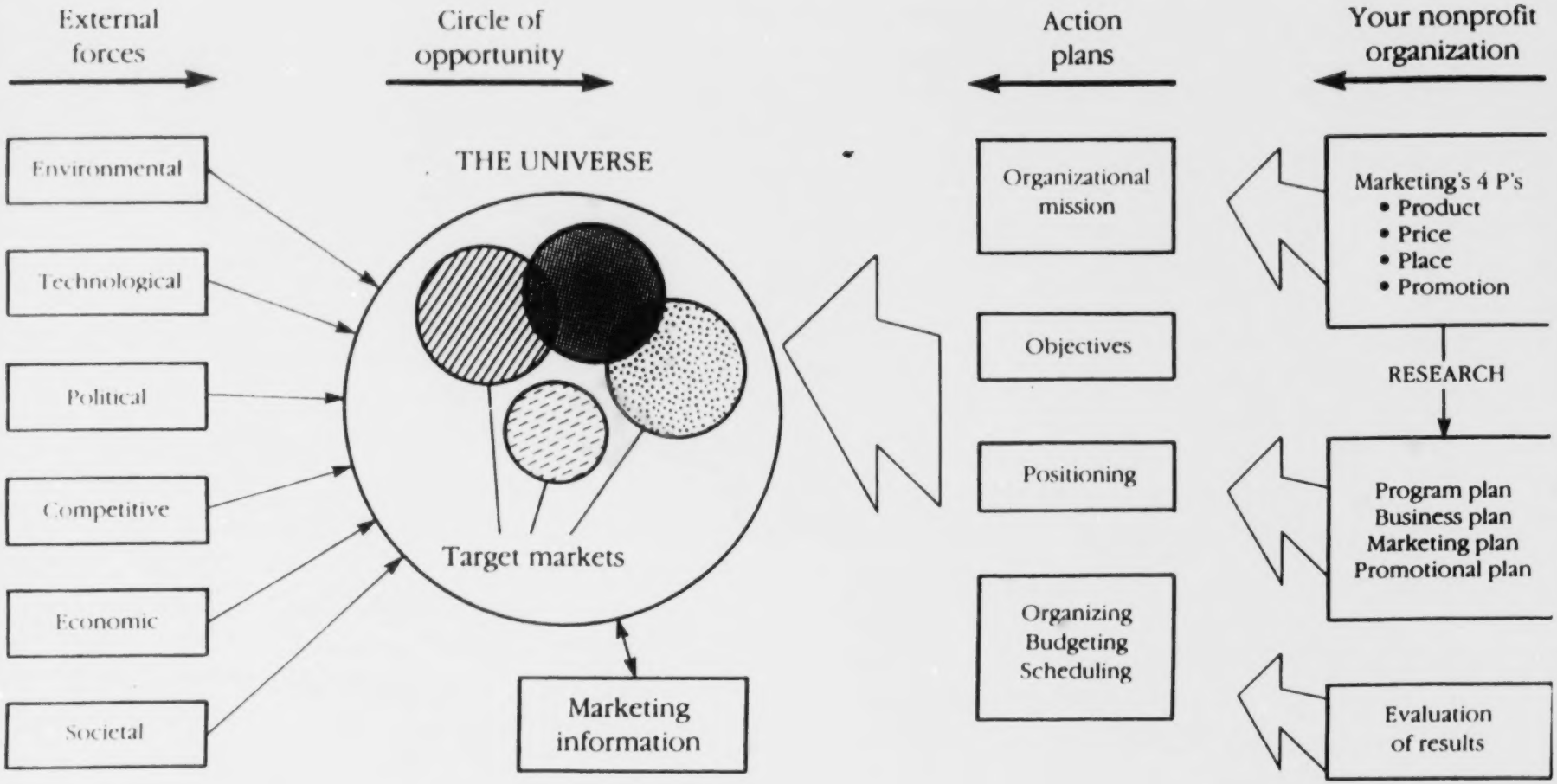

Figure 13: Marketing Planning Map

Customer service is, unfortunately, all too often taken for granted. Poor customer service can contribute to significant decline in enrollment. It is therefore essential to build into a marketing strategy for higher education continuous review of admission, recruitment, financial aid, counseling, billing and classroom tactics. The campus that is market-driven is customer-driven and therefore student-driven. The campus that recognizes the importance of continually assessing the reaction of our past and present students will enable us to serve our future students better. The feedback received is telltale to our success. If we respect the input and respond as change agents, we can remedy or rectify our poor service and we will be in a position to capitalize on this market in two ways: serving our present students so they will stay with us and, of course, attracting new students. All the positive marketing that attracts students but then subsequently loses them is faced with the grim reality of decline. This has a ripple effect and can pose serious problems in the future. Some of the issues that affect our enrollments are truly beyond our control. Therefore, the issues in our control must be dealt with proactively. There is no excuse for not serving our students as valued customers. We should and could change the course of all our marketing, enrollment, and management outcomes if, internally and externally, we embrace the notion of service. That is our business: Serving the educational needs of our communities. Internal and external change should not be resisted but embraced by facing the challenges of the next century. NOW IS THE TIME FOR CHANGE.

SUMMARY

" ...The transformation process, like any change process, is replete with challenges and barriers. Anticipation of these forces will go a long way to help reduce or eliminate resistance. Opportunity, as well as crisis and pain embolden leadership to change. The research conducted by Darryl Conner, president and CEO of the Atlanta-based firm, ODR, Inc., indicates that there are four fundamental challenges to change implementation efforts:

1) Change Sponsor. The individual/group who legitimizes the change.
2) Change Agent. The individual/group who is responsible for implementing the change.
3) Change Target. The individual/group who must actually change.
4) Change Advocate. The individual/group who wants to implement change but lacks sponsorship.

Now is the time to change the paradigm in higher education to an entrepreneurial enterprise. The key factors that must be embraced in the marketing plan are:

- Creation of customer-driven marketing strategy

- Rather than relying on unsupported assumptions, research our markets to determine who they are, what they want, and what affects their decision-making i.e., choice-making for educational opportunities
- Review mission, plan strategically, research, and market our institutions with purpose.
- Become a service enterprise and remember what our business is.
- Embrace change, rather than resist change.

The goals of the marketing plan must come from the executive management of the institution and its Board of Trustees. As in the business world, the educational marketing plan must be a key ingredient of the annual business plan and the long-term strategic plan, thereby being an essential tool for managing the goals and objectives of the institution.

USING TECHNOLOGY TO REVITALIZE THE LECTURE:

A MODEL FOR THE FUTURE

Mid-Career Fellowship Program

Marilyn Gilroy

Spring 1998

SUMMARY

Many faculty teaching introductory level courses in the community college are struggling to effectively deliver the traditional lecture, finding it almost impossible to maintain students' attention for more than 20 minutes. This paper presents background on why some students may be less responsive to traditional lecture/discussion and offers one model, based on a "high tech" state-of-the-art classroom facility, for revitalizing the lecture. A summary of advantages and disadvantages of this approach is presented at the end of the paper.

INTRODUCTION

"For the first time in my teaching career, I'm having discipline problems. They [students] just don't want to pay attention."

"Our students won't read. They complain if I ask them to read anything extra and even look at me with disgust when I tell them they are responsible for reading assigned chapters in the text."

"Many of my students don't care about education or ideas. They are so ur focused."

"I work hard on my lecture content and delivery but I often feel like the class is dragging."

"It's tough to keep going when you see students shuffling books and coats during class and they seem desperate to get out."

These are actual quotes from my colleagues, derived from informal conversations and faculty development seminars. They are not the words of chronic complainers or burned out educators-- these comments come from dedicated professors who are still excited about their subject matter and the teaching profession. Their sentiments are often echoed by faculty members from all disciplines who voice frustration about using the conventional lecture/discussion mode in the classroom. They are questioning a mode that has been the core of their own college education and of their teaching. They are wondering if they have become less effective or if their students are less dedicated and motivated.

In truth, there are a small number of professors who are constant complainers and see themselves as martyrs in the hopeless cause of educating inferior or poorly prepared community college students.

But the majority of community college faculty are struggling to face reality -that there has been a fundamental shift in the attitudes and attention spans of our students. They are challenged and perplexed about how to respond to the noticeable differences in today's students and have worked hard to adjust their teaching methods to accommodate the changes. And the basic tenent of college teaching- the lecture- is the focus of the transformation.

Based on the accounts from faculty whom I have interviewed from the humanities, social sciences, business and mathematics, it is getting harder and harder to deliver content in the form

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of the traditional lecture- they just can't hold the students' attention. All of them reported that after about 30 minutes, they were faced with varying degrees of yawning, sighing, clock-watching, doodling, talking, or paper shuffling leading to a feeling that they had "lost" the students. The exception to this was one faculty member who taught small, upper level honors courses which often engaged in lively discussion and produced excellent research papers.

College teachers have been lecturing, that is, synthesizing, summarizing, reporting, and illuminating on concepts, ideas, and events since the dawn of higher education. The lecture has survived centuries of educational reforms, new modes and "delivery systems," and it will probably survive the current "technological tornado."

However, my own experience plus the research I have done over the past year lead me to believe that many students are not receptive to lectures and that technology may provide one possible key for revitalizing the lecture.

Why Are Today's Students Different?

If today's students seem less responsive to traditional lectures than their predecessors, it may have something to do with the fact that they have grown up and been educated in a world where the screen is a fundamental part of their daily routines. They write on a computer, get most of their news and information from TV, and entertain themselves for hours with video games.

It is well documented that our students have watched more television than any other previous generation. In fact, by the age of 10, most of today's students had already spent more time in front of a television than they will ever spend in college classrooms getting a degree, even if they go on to a Ph.D.

It is also documented that individuals under 30 read far less on a daily basis than their counterparts of 20 years ago. This has been a cause for alarm on the part of newspaper and magazine publishers who have watched their circulations decline every year. Most publications

have forged partnerships with cable television or mounted webs tes to ensure some hope of building the kind of loyal following that once came from print readers and subscribers.

Add to this media mix the fact that the remote control and computer mouse have made it possible for our students to surf through 80 television channels and click through computer programs at a frenetic pace. Knowing this, the producers of television commercials, music videos, films, and broadcast news are all serving up images and words at a much faster pace than 25 years ago.

Experts say that while this visual glut has given students the ability to process rapid and discontinuous images at an impressive rate, it has also diminished their attention spans and the ability to concentrate. They have been dubbed as "visual grazers" with little patience for the slower tempo of more traditional cultural pastimes such as classical music and theater.

Is it any wonder that the human voice of a faculty member talking at normal speed for 20- 30 minutes fails to holds students' attention?

Bridging the gap

Rather than ignore this phenomena and noting the attention deficits of my own students during lecture/discussion, I began to wonder **... if technology is central to so many aspects of contemporary life, should it not be central to the learning process? Don't I owe it to learners who will be functioning in a world dominated by technology to use these tools to teach?**

In 1993, I started making significant changes in my teaching style in two sections of an introductory level communication course. I began relying heavily on visuals, such as short 3-8 minute clips from television programs I had recently taped, or pictures and charts from newspapers and magazines to supplement lectures and stimulate discussions. At the same time, the Internet was emerging with all of its ramifications for research and entertainment. Noting

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how rapidly college students responded to this new media, I asked for and received access to an America On-Line account and computer for use in my classroom demonstrations.

To integrate visuals from these various sources on a regular basis was not easy. At Bergen Community College, the faculty member must bring the TV and VCR to the classroom on a rolling cart which must be transported through long hallways and several building levels. The quality of the monitors and the sound is often poor. The overhead transparency equipment does not provide the kind of clear, colorful image needed from print materials. The computer with access to America On-Line and projection capabilities was housed in a different classroom with a telephone line. Another classroom contained the interactive video technology. In the course of the semester I had to make visits to four different classrooms. This was not an easy feat of scheduling when dealing with multiple sections of a low level course enrolling 35 -40 students in each section.

But I continued to use visuals to enhance my lectures because I saw the reactions of students. They were more enthusiastic, participated more in discussion, and benefited from the examples that were on the screen. Although I had always revised and updated my lectures and tried to provide interesting material in a lively manner, **the fact was that nothing packed the punch of the visual!**

So I spent much of 1994 trying to persuade the administration that I was having difficulty using this approach given the limitations of the college's conventional classrooms. Enrollment for the course started to increase and a few more sections were added. This made me increasingly desperate for a designated classroom with the technology to support the teaching and learning that had evolved.

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THE INTERACTIVE/VIDEO CLASSROOM: One Model for Using Technology to Enhance Learning

Fortunately the timing of my request for such a facility coincided with a statewide push toward technology and distance learning and funding became available via the New Jersey Intercampus Network.

Within 18 months, I was up and running in a classroom (designated C107) that remains state-of-the-art. Although originally designed and still used for distance learning, it was also equipped with everything that I had requested.

Here is a partial list of components:

TV monitor- 40" large screen monitor used for viewing local and remote sources
Videotape playback units
Videodisk players
Quadraphonic Sound system
Cable television- access to 85 incoming cable channels
Robotic Cameras- remote control with ability to follow instructor and zoom and focus on students
Student desktop microphones
Graphic Camera-Elmo- allows full-color viewing of flat copy or objects with zoom and focus capability
Computer- Pentium processor with multi-media capabilities and Internet access plus a variety of software
Telephone/fax/printer unit with AT&T handset telephone- can be used for teleconferencing. Callers can seen over monitor and heard over speakers.
Routing switchers, interfaces, mixing units, modulators, and cable wiring.

All images, whether videotape, graphic, or computer, appear on a full size monitor and the screen has quad viewing windows, meaning it displays four video screens in one thus eliminating any need for multiple monitors.

All components interact simultaneously with one another and are controlled from one console (See Appendix A) making it possible to switch from Internet to video to overhead with the push of a button. Although the console may look daunting, after a while it becomes as familiar as any other keyboard or remote control device.

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The student seating and tables for 40 are very comfortable. The room is on an independent climate control mechanism which enables me to control the heat and air conditioning temperature.

The cost of all of this was approximately $250,000 not including the labor for installation which was done by our own technicians with the help of AT&T and Bell Atlantic. The facility was built adjacent to the offices of the technical support staff who maintain it. For the first year, they checked with me before each class to make sure that every component was operational. Currently, the technology is very reliable and I merely pick up the phone and call for help if a problem occurs.

We have also limited access to the facility for use by 3-4 instructors who are trained to use the equipment.

During the past 2 1/2 years, using this technology has transformed my lectures/discussions. Specifically, it has enabled me to:

*Create a learning environment that is consistently intriguing.

*Combine visual and interactive experiences with traditional lecture/discussion methods

*Develop a series of activities that unifies learning

*Use a variety of approaches that help avoid boredom and may tap into the various learning styles of our students.

Using the video, computer, and graphics display options in the classroom, I have been able to reach students who learn more effectively through active methods, relying in part on visual and sensory input rather than the verbal and passive delivery style of traditional lectures. The existence of these various student learning styles has been documented by results of Kolb's Learning Style Inventory and Solomon's Inventory of Learning Styles administered in introductory level courses at various colleges and universities.

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By integrating technology into the course, I have also enjoyed the satisfaction of providing students with critical thinking experiences that are specific to the kinds of media that proliferate our culture. I believe this is one way to fulfill part of our college's mission statement of "preparing citizens for responsible participation in their society." My students are able to see, hear, experience and analyze the impact of the media that is part of their daily lives because I am using it to enrich the topics covered in the text.

This mode of teaching does not in any way replace the text. Quite often, I use the text and project some of the illustrations that the author has chosen. I magnify and zoom in on certain images as a means of emphasis and reinforcement. However, I also use the classroom's marker board to summarize key points. Since writing on the board is now the exception rather than the rule, my students give it special attention.

The visual is a very strong ally in my teaching. For example, in teaching the history of the press, I am able to project newspaper copy from colonial days through all of the important periods of journalism.

And my students get more involved in the process. Their self-consciousness decreases in response to the interactive nature of the technology. I encourage students to come to the front of the room and use the technology to facilitate class discussions with me.

However, all of this is not a panacea. Like many faculty who use technology, I have to do more planning, not less. I have to make sure that I combine the visuals with key questions, both open-ended and closed. In some ways it takes more work to arrange a lecture into a coherent and rational pattern because there is so much wizardry available. Being the first on campus to have these capabilities, I have felt more responsibility to do it right. I am still struggling to create tests and writing assignments that assess its effectiveness.

We recently surveyed the students who had been taught in this facility for the last two years. The responses were overwhelmingly positive. Many of them said that the technology had sparked their interest and that the teaching was excellent. The number of course sections has

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increased from 3 to 6. The challenge remains to offer documented, irrefutable proof that more learning is taking place.

In 1996, the college began construction on a new wing of classrooms. The interactive video classroom was used as a model for layout and technology standards. Although these classrooms do not have all of the C107 components, they are equipped with teaching stations that contain video/computer and graphics presentation capabilities. The classrooms are used mostly by faculty from business, social sciences, and nursing, but they are available to any faculty who want to incorporate technology into their course.

Anyone contemplating using this highly technological approach to teaching may wish to keep in mind the following:

Disadvantages and possible obstacles

* Some institutions do not have the monetary or human resources to offer such a teaching facility

* Extended training and usage is needed to understand and explore the possibilities of this technology.

*Technology may not be appropriate for all disciplines, faculty, or students.

*Teaching space is not flexible. Because of wiring and equipment placement, tables and chairs cannot be moved for group activities or roundtable discussions.

Possible Advantages

*Gives instructor and students immediate access to the world beyond the classroom

*Enables instructor to provide information that is up-to-date, based on current events and images, thus stressing relevancy of course.

*Helps instructor and student maintain enthusiasm for subject matter

* Provides additional models for analysis and questions

* Engages students listening, thinking, and participating

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Final thoughts

Sometimes I am nagged by the feeling that I am teaching on the set of "Star Wars" rather than a classroom dedicated to teaching and learning. I recognize that I have become very dependent on this technology to teach certain courses. For me, it is no longer an option, it is a necessity - given the nature of my students and the course material that I teach.

Occasionally I have been asked to give demonstrations to colleagues and visitors on a one-to-one basis and as part of workshops. The administration has used this classroom as a showpiece. Several times during the year, potential donors to the college foundation visit C107 while I am teaching so the college can make its pitch for more money from the private sector. I generally don't mind because I am proud of my work and grateful for the support I have received.

A few of my faculty colleagues have made it clear that they feel my approach to teaching is not as scholarly or seriously academic as theirs. They smugly suggest that mine is a frivolous, faddish approach catering more to entertainment rather than educational needs.

Some of my colleagues wear disdain for technology like a badge of honor and that is their right. Many are gifted teachers without any help from technology and it would be wrong to suggest that they need to change their methodology. I have interviewed excellent professors who are reinventing lectures in their own way by incorporating demonstrations, oral and written exercises, and group work.

However, for those who are searching for ways to understand how the new technologies may converge to redesign and enhance the lecture, I offer the model of this state-of-the art facility which has provided valuable learning experiences for both the teacher and the student.

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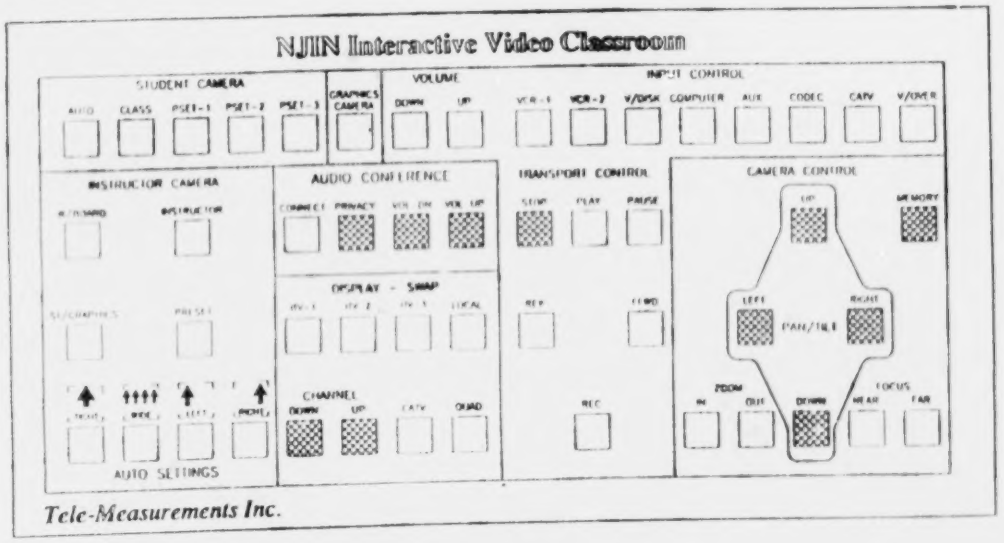
Appendix A

USER VERSION



= MULTI-FUNCTION BUTTON

MULTI-FUNCTION BUTTONS

BUTTON	WHEN THE INV1 BUTTON IS LIT	WHEN THE INV2 BUTTON IS LIT	WHEN THE INV3 BUTTON IS LIT	WHEN THE CATV BUTTON IN DISPLAY SWAP IS LIT	WHEN THE VCR-1 BUTTON IS LIT	WHEN THE VCR-2 BUTTON IS LIT	WHEN THE VOIP BUTTON IS LIT
INV1							
INV2							
INV3							
CATV (in display swap)							
CHANNEL DOWN	INV1 CHANNEL DOWN	INV2 CHANNEL DOWN	INV3 CHANNEL DOWN	CATV CHANNEL DOWN		40* RF CHANNEL DOWN	
CHANNEL UP	INV1 CHANNEL UP	INV2 CHANNEL UP	INV3 CHANNEL UP	CATV CHANNEL UP		40* RF CHANNEL UP	
PRIVACY	INV1 POWER CONTROL	INV2 POWER CONTROL	INV3 POWER CONTROL	CATV POWER CONTROL		40* POWER CONTROL *	
VCR	INV1 DISPLAY CONTROL	INV2 DISPLAY CONTROL	INV3 DISPLAY CONTROL				
VCR/CTL OVER							
UP							
DOWN					VCR 1 POWER CONTROL	VCR 2 POWER CONTROL	VOIP POWER CONTROL
LEFT						40* PIP SOURCE	
RIGHT						40* PIP CHANNEL DOWN	
MUTE/UNMUTE						40* PIP CHANNEL UP	
CONF/REJECT VOL DN	INV1 VOLUME DOWN	INV2 VOLUME DOWN	INV3 VOLUME DOWN	CATV VOLUME DOWN		40* PIP CONTROL	
CONF/REJECT VOL UP	INV1 VOLUME UP	INV2 VOLUME UP	INV3 VOLUME UP	CATV VOLUME UP			

* ONLY WHEN AUDIO CONFERENCE IS NOT CONNECTED

REV	DESCRIPTION	DATE

Unless otherwise specified all dimensions are in inches
Do Not Scale Drawing

TELE MEASUREMENTS Incorporated
ENGINEERING DEPARTMENT
145 MAIN AVENUE
CLIFTON, NJ. 07104

PROJECT: NJIN VIDEO CLASSROOM
DESCRIPTION: CONTROL PANEL MULTI-FUNCTION BUTTONS USER VERSION

ENGINEER	DATE
GEORGE APARICIO	5/11
DRAWN BY	DATE
GEORGE APARICIO	5/11
CHECKED BY	DATE

SCALE	SIZE
NTS	
JOB NUM R 4454	SHEET 01

DRAWING NUMBER: 4454 010

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Survey of Technology Use

in Mathematics

at

New Jersey's

Community Colleges

Jean Lane
Union County College

Probably the first graphics calculator to appear was the Casio fx-7000G, followed closely by the first symbolic manipulation calculator Hewlett Packard's HP-28. This was around 1988; the succeeding decade has seen a family of TI-80-Somethings, Casios, Sharps, and HP's, as well as a wealth of computer software that can do graphical, symbolic, and numeric operations for all levels of mathematics.

I attended my first graphics calculator workshop, sponsored by the New Jersey Department of Higher Education, in 1989. Since then, I've attended numerous conferences, workshops, and minicourses dealing with calculators and computers in mathematics education. From 1991 to 1994, I was project director for two National Science Foundation funded grants which helped a group of New Jersey and Pennsylvania two year colleges introduce graphics calculators into precalculus and calculus courses. Computer software seemed to us to be a natural followup to these endeavors, and now the Internet has exploded on the scene.

Within a decade, we have seen countless high schools start to use graphics calculators in most mathematics courses. Calculators are now required on the Scholastic Aptitude Test (SAT), both regular and the Mathematics Achievement Tests; and graphics calculators are required on the Advanced Placement Tests in Calculus. In the three years prior to the implementation of that mandate, the College Board through Clemson University sponsored a massive effort to train as many AP Calculus teachers as possible in the effective usage of the TI-82 and HP-48; those attending summer workshops at Clemson would in turn train those teachers who couldn't attend.

It is not my intention in this paper to make a case for or against using technology in mathematics. I will not present a survey of the literature for articles by pro-/anti-technology advocates citing its effectiveness/ineffectiveness. (I've been told the technology debate in mathematics is as heated as the quill pen versus pencil debate was many, many years ago!)

From my own experiences, I believe that anything is effective to someone. Are graphics calculators and computer algebra systems effective? Yes, with some students, they are -- maybe even with the majority of students. That isn't the point. It's not a matter of if the technology works. These things EXIST. Many high schools (and even some primary schools!) are lightyears ahead of us in their use. Parents go out and buy them for their kids. Students will use them in the workplace and/or at the four-year college to which they transfer. We would be shortchanging them if we ignored this important aspect of their education. It is our responsibility to see that these machines are used correctly, to the best possible advantage. How we do that, is beyond the scope of this paper. There are perhaps thousands of books and articles dealing with graphics calculators or computers in a vast array of mathematics courses.

After a decade of activity and change, it seems a good idea to take stock of what New Jersey's community college mathematics departments are doing. Of the nineteen colleges surveyed, sixteen have responded for this report. Only one of them currently does nothing; some in the department want change in the near future, but debate whether to use graphics calculators or computers. Perhaps what other two year colleges are doing may help them decide.

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REGARDING CALCULATORS .....

The first section of the survey dealt with graphics calculators. The table below summarizes the courses in which graphics calculators are used, whether recommended or required in how many schools, and the brands used.

TABLE ONE
Calculator Usage

Course	Recommended	Required	Brand(s)
Trigonometry		1	TI-82
Math Analysis Bus	1		TI-81
Precalculus *	2	7	TI-82
Calculus I	5	6	HP-48, TI-etc
Calculus II	5	4	HP,TI,Sharp9300c
Calculus III	5	4	same
Intermediate Alg.	3		TI-82
Col. Alg.& Trig.	1	2	TI-81/82/83
Applied Calculus	2	3	TI-82/83/85
Discrete Math	1	1	
Linear Algebra	1	3	TI-82/83, HP48
Differential Eq.	3	2	TI-82/92, HP48,Sharp9300c
Statistics **	3	3	TI-82/83
Finite Math	1	2	
College Algebra	3		TI-82/83

* Some colleges have both a Precalculus I & II; some don't.

** Some colleges have Statistics I & II; others have two or three different statistics courses based on level or program.

No mention was made of any Developmental Mathematics courses; one obvious reason is that these machines are "over-kill" at the level of Basic Skills. (Whether any kind of calculators are used in Developmental Mathematics is another issue beyond the intention of this survey.)

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The most widely used machine is Texas Instruments' TI-82/83. Other models used are the HP-48 (2 colleges), TI-85 (three colleges), TI-92 (two colleges) and the Sharp 9300(c). Only one college allowed students to select the model/brand they wanted.

As for how the students obtain their calculators, most buy them from any store. One college rents them through the Mathematics Department, and one through the college bookstore. Three lend them without any fee; these colleges seem to have the same procedure and problems. Students' records are flagged and students who do not return the calculator are blocked from future registration. However, exceptions are made during advance (early) registration for current students; so tracking the calculators is a nuisance. One college has two class sets that travel to various courses for in-class use only.

COMPUTERS ....

Of the fifteen colleges who use technology, three do not use computers; they require/recommend graphics calculators only. Atlantic Community College recommends the TI-82 for College Algebra and Intermediate Algebra. However Camden County College and Middlesex County College require graphics calculators in (almost) all their mathematics offerings. Camden lacks the computer facilities. Middlesex has the facilities and used Derive and Minitab for several years, but no longer does so.

Twelve colleges make use of available computer software in the same previously mentioned courses, in some cases in addition to the graphics calculators, and in some cases instead of the graphics calculators . This time, however, Arithmetic and Elementary Algebra classes also partake of Computer-Assisted-Instruction at five of the colleges. Eleven use computers in Calculus I-II- III; Mercer County College uses computers in only one section of Calc I. Five use software for Differential Equations. Nine also use software in Statistics. Table Two below summarizes all the courses effected. As for how the computer is used, nine give in-class demonstrations; ten have some variety of class-connected labs; and ten give out of class assignments.

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TABLE TWO
Computer Use

Course	Number of Schools of 12
Arithmetic (Basic Math)	5
Elementary Algebra	5
Intermediate Algebra	2
Precalculus *	3
Business Precalculus	1
Business Calculus	1
Calculus I #	12
Calculus II	11
Calculus III	11
Differential Equations	5
College Alg. & Trig.	1
Linear Algebra	3
Finite Math	2
Discrete Math	1
Statistics **	9

* Some schools have a Precalculus I & II.

Mercer CC uses computers in only one section of Calc I.

** Some schools have Statistics I & II; some have two or three different courses due to levels or programs.

By far the most popular program, used by ten colleges, is DERIVE, an easy-to-use computer algebra system that incorporates graphing and symbolic manipulation, and can be used from Precalculus up to Differential Equations and Linear Algebra. Next popular was Minitab, a statistical program; Converge, and MathCad . Table Three shows the various software packages used.

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TABLE THREE
Software in Use

Software Package	Number of Colleges Using It
Derive	10
Converge	5
Phaser	1
Minitab	5
MathCad	5
MPP (freeware Naval Academy)	1
Statdisk	2
Matrixpad	1
Bestgrapher	1
SAS	1
Maple	1
MATLAB	1
Publishers Stuff!	2

THE INTERNET....ETC.....

Regarding the Internet, four colleges don't use it at all, but not necessarily the same four who don't use computer software in their courses. At least one of them (Ocean CC) isn't even connected, and Camden CC has only one computer connected to the Web! Seven use the Internet for students' research projects, three for demonstrations in class, and four for faculty research (for two colleges, that's their only use of the Internet.). Two colleges even have course home pages.

One college (Brookdale CC) reported having a classroom lab facility devoted to mathematics. Six have computer labs available to students; three have computers available in Learning/Resource Centers. Two report labs with Internet access for students (Union and Hudson). Five colleges report that all faculty have computers in their offices.

Only two colleges reported that adjuncts don't use the technology; at twelve, both full-time and adjunct faculty made use of technology in their courses. As for training, seven colleges provided workshops on the computer software and calculators for faculty members, with five specifically targeting adjuncts. Five provided no training at all.

Comments about problems or just general comments were solicited. Regarding graphics calculators, only the previously mentioned loaner problem was cited. Lack of facilities was cited a few times with respect to computers. General problems cited included lack of interest from the faculty with only a small number of faculty willing to use technology; lack of training; lack of skills; lack of administrative support or encouragement. The survey did not ask for perceived or verified results on student learning or enthusiasm in using the technology. A copy of the survey, which was sent to

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the MATYC-NJ (Mathematics Association of Two-Year Colleges of New Jersey) representative on each campus, is appended to this report.

Colleges Responding to the Survey

Atlantic Community College
Bergen Community College
Brookdale Community College
Burlington County College
Camden County College
County College of Morris
Cumberland County College
Essex County College
Hudson County Community College
Middlesex County College
Mercer County Community College
Ocean County College
Passaic County Community College
Raritan Valley Community College
Sussex County Community College
Union County College

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TECHNOLOGY USAGE SURVEY

NAME_____

COLLEGE_____

PHONE_____ EMAIL_____

1. Are graphing calculators used in any of your college mathematics courses?
   NO_____ (skip to questions # 4)
   YES_____

2. In which courses?

Category/ title	Brand /Mod. Calc.	Required or Recomm.

m:\work\word\981\survey.doc

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2. Any comments on the model: _____

_____

_____

3. If calculators are required, how is this handled:

a. Students purchase them _____

from any store _____

at college book store _____

b. students rent them from college _____

through the book store _____

through the mathematics department _____

c. Calculators are loaned with no fee _____

Any comments on how this process works? _____

_____

_____

4. Are computers used in any mathematics courses at your college?

NO _____ (skip to "end of survey")

YES _____

5. How are they used: check all that apply

a. In class for demonstration _____

b. In lab setting _____

c. For outside of class assignments _____

d. For Internet access _____

6. In which courses are computers used?

CAT #/ TITLE	ANY COMMENTS

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7. what software packages are used? How often & what courses?
   Derive
   Converge
   Mathematica
   M P P
   Math Cad
   Mat Lab
   ƒ (Z)
   Maple
   MAC Math
   Phaser
   other?

8. Do your faculty use resources on the Internet?
   Yes _____
   No _____

9. If yes, how?
   In class demonstrations _____
   Student research _____
   Course home page _____

10. What facilities are available to your faculty and students?

11. Who uses this technology?
   Full time faculty?_____
   Adjuncts? _____

12. Did your department /college provide any training in the use of these technologies, particularly for adjuncts?

_____
_____
_____

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"END OF SURVEY"

If your department doesn't use any or specific technologies, why not?

_____

_____

_____

Would you mind being interviewed if I need further information? Particularly if your Dept. doesn't use any technology.

_____

E- mail or phone preferred?_____
Best time to call _____

Thanks for your help!

Please use the enclosed self-addressed stamped envelope to return the survey to:

Prof. Jean Lane
Mathematics Department
Union County College
1033 Springfield Avenue
Cranford, NJ 07016

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Karl Oelke
Mid-Career Fellowship Program
Prof. Ted Rabb
15 April 1998

It's Recruiting, Stupid!
(Reinvigorating a Two-Year College Honors Program)

Background

I was appointed director of the Honors Program at Union County College (NJ) on 1 June 1995. After ten years, the program was in trouble. It had started vigorously in 1985 and flourished for about four years, with reasonable numbers and high quality. Then, for a variety of reasons, including reduced resources, pressure to increase enrollments, and, not surprisingly, frequent turnover in directors, the program declined, in quality and numbers. After a committee's study, 1994-95, the administration decided to give the program another chance: if I could get both quality and numbers up in about five years, we would keep the program; if not, the program would go.

The Honors Program was developed to offer an enriched learning experience for bright students. The subject ,matter and teaching-learning approaches help students develop analysis, problem solving, critical thinking skills as well as the self confidence to equip them to transfer to any four-year college they can afford. In addition, the Program provides growth and development for faculty by offering them the opportunity to work with these students and provides enrichment to the College community with its lecture program.

Our honors program consisted of an option to the Liberal Arts Program. Although "friendly" to students interested in the humanities, the program discouraged participation by nursing, science, business, and engineering students because of the limited number of electives in their programs.[1] In addition, although the two-semester humanities course drew a reasonable number of students (not all of whom matriculated in the liberal arts honors program), it was always difficult to get enough students in the third semester course. (The independent study course was always handled on a per-student contract basis with individual faculty members.)[2]

The Challenge

The College prefers at least double digit enrollment in courses (or, in multi-section courses, double digit in each section) to allow them to run, and would like 15. That means making recruiting the first priority. However, numbers alone don't do the job: without academically gifted students, the program fails. The quality of instruction goes down, students attempting to transfer either don't or, if they do, they don't do well after transferring, and word of mouth does the rest. So recruiting means attracting academically gifted students.

What does the College have to draw upon? Located in a county with a heterogeneous population ranging from upper middle class New York City commuters to lower middle class blue collar workers, from wealthy suburbs to inner-city tenements, the College operates three campuses, one suburban and two urban, with several programs

in allied health technologies operating at a fourth campus where it owns two buildings (leased to the University of Medicine and Dentistry of New Jersey) on a site shared with the County Vo-Tech School.[3]

County and College demographics generally reflect what's happening throughout New Jersey, although Union County College is one of the largest in the state and one of the few multi-campus two-year colleges.[4] The county high schools may, however, differ from what other two-year colleges deal with. Attitudes of parents, students, and some guidance counselors reflect a negative attitude toward the local county college, making it difficult to recruit directly from the high schools.[5] I see some of that attitude reflected in reports of college placement of the top graduates of some of those high schools. One such report, listing the top 28 and 32 graduates from two recent years, listed schools like Harvard, Yale, Dartmouth, Stanford, Princeton, Columbia, Brown, Carleton, Weslyeyan, and Amherst.[6] Guidance counselors see no benefit to their image in having the local county college listed on their reports.

Another complicating factor in recruiting is the large number of colleges and universities in close proximity. Within a ten-mile radius of the College lie six four-year colleges (Drew, Fairleigh Dickinson, Rutgers [Newark], and Seton Hall Universities, The College of St. Elizabeth, and Upsala [only recently closed]) and one other two-year college (Essex County College). Just outside that ten-mile zone lie Bloomfield College (11 miles), Jersey City State College and Middlesex County College (12 miles), and the main campus of Rutgers University in New Brunswick (13 miles). This gives students who

might consider staying in the area an array of higher education choices rarely encountered in other counties. And it gives the Union County College recruiter an array of problems rarely encountered anywhere.

The criteria to enter the UCC Honors Program include a 3.5 GPA, 1100 SATs, standing in the top quarter of the high school class, or special talents. For students already enrolled at the College, we look for a 3.5 GPA. We believe those criteria will allow excellence of instruction that will prepare students to transfer successfully to the most competitive four-year schools. However, with that kind of record, students get accepted at most four-year schools and some competitive four-year schools, and get decent scholarships too. How to compete?

Part of our competitive disadvantage was our ability to offer an honors program only for students interested in the liberal arts. Nursing, science, business, and engineering majors had too few electives to complete the program. If we were going to attract more gifted students, we needed to find a way to offer honors designation to students interested in majoring in programs other than the liberal arts. And, if we were going to expand course offerings, we had to consider the quality of instruction we could offer. I did not want the program to set high standards without some assurance that we were also focusing on ways to assist students in meeting those standards. That meant some kind of faculty development opportunities.

Transfer has never been a problem for our honors program students. From the beginning, our students have been accepted at competitive colleges and universities. Princeton (when they accepted

transfer students), Columbia, William and Mary, Georgetown, Penn, Rutgers, Douglass, College of New Jersey, and Drew are just a few of the many places to which our students have transferred successfully. However, almost no one in the high schools knew of that record.

Scholarships were also a problem. Although one of our primary advantages is low cost (about one-tenth that of competitive four-year colleges and half that of the state colleges), many four-year schools offer generous scholarships to the very students we try to attract. When the program began, almost all of the honors program students were given full scholarships. However that ceased after about four years, and students had very little incentive. Finding funding for honors program scholarships remains a concern.

Advantages of the Program

Why would a student with the qualifications we demand want to come to the local community college instead of matriculating directly at an elite four-year college? Two primary reasons stand out: cost and nurture.

Tuition and fees at our two-year college run less than half those at the state colleges in New Jersey (less than $3000 vs. $8000 at Rutgers), and about one-seventh those of elite colleges (about $21,000). Getting the first two years' work done with us leaves students (and parents) with a sizable sum of money to invest in graduate school (or other college expenses).

We also provide small classes and nurturing instruction for the first two years, crucial in establishing a student's sense of self and

self esteem. Although many students are financially and emotionally prepared to face the challenges of an elite four-year college, many are not. Our small classes and caring faculty provide the attention that helps them develop the skills and confidence to work up to their potential.

For example, our laboratory science courses put students in small sections of no more than twenty (one of our honors sections had only nine students) with access to the most advanced laboratory equipment. The lectures are coordinated with the labs, and sometimes the same instructor does both lab and lecture. At many four-year colleges, the freshman laboratory science courses run with hundreds of students, with very limited access to the latest equipment, almost no access to the primary instructor, and often no coordination between lecture and lab.

An Approach

One of the first things we did was articulate our concept of an Honors Program. Our program supports the transfer function of the College's mission, and provides, within that context, enriched, qualitatively different instruction. Faculty teaching honors courses will generally:

1. Make the reading list longer and the content more comprehensive and demanding than that for regular courses. We're concerned not merely with **more**, but with **qualitative** difference.

2. Select teaching methods that respect the advanced capabilities of students and use a seminar approach whenever possible, involving students in direct, collegial participation.

3. Incorporate some form of self directed, independent study to help students develop into self starters, self motivators, and self teachers.

4. If at all possible, use a critical research paper as one of their assessment tools. Seeking material in the library, on the Internet, or in other sources, incorporating primary and secondary sources into an original formulation, and organizing the result in an interesting, articulate form is one of the most important experiences we can lead honors students through.

5. Use a cumulative final evaluation, using essay requirements that focus on integrating material in a clear, cohesive way, relating this material, if possible, to other disciplines and larger concerns. This is a major intellectual task honors students must learn to handle.

In a sense, faculty involved with honors students are coaches, preparing students for transfer to elite colleges and universities where their success depends on caring but demanding preparation.

Given those guidelines for the program itself, the challenges lie at the beginning, middle, and end of a process. To recruit the gifted students at the beginning, we need to show consistent transfers to desirable four-year colleges at the end. We also need effective programs of instruction in the middle. And somehow we need to get the news to the high schools of what is available for their gifted students. Because I want to focus here on recruiting, let me just say

that we ran some courses for faculty on the teaching-learning process, helped them develop some new course offerings, are making it possible for students to earn honors designation in other programs, and have initiated action to increase the number of full scholarships. We began a mentoring program so honors faculty could keep a close, nurturing watch on our honors program students. We were also fortunate to have students in the program who were accepted at Tier One colleges in 1996 and 1997 and have done well.

I can recruit from two pools of students, those already accepted at the College, and those in the high schools.[7] Within the College, I use four primary methods:

(1) Computer search. At the beginning of each semester, we get a list (with mailing labels) of students with at least 9 credits and a GPA of at least 3.3. Using that list, I write appropriate students, congratulating them on their academic record, describing the Honors Program and the courses, and inviting them to consider enrolling in the program or a course or two.

(2) Faculty search. Around mid-semester, about the time students will begin registering for the next semester, I ask all faculty to send me a list of students doing "A" work in their courses, students whom they think would do well in the Honors Program. I then check the students' records and, if they are doing well overall, write them, mentioning that their instructor recommended them, and ask it they're interested. I also do this at the end of the semester.

(3) Honors society search. Although the computer search will identify most of these students because of their grade point average, it won't identify them as honors society members, so I ask

faculty advisors of our student honors societies to recommend their students. When honors society students get a letter stating that their faculty advisor has recommended them, even if it's a second letter, the likelihood of their taking notice increases.

(4) Skills test search. The College requires most students to take a basic skills test when they enroll. The Director of Testing sends me the names and scores of all students scoring in the 90th percentile or above. When students score high in the tested areas (two in math, two in English), I send them a letter congratulating them on their high scores and invite them to consider the Honors Program.

I reach students outside the College in several ways.

(1) SAT search. Each year our admissions office gets from Educational Testing Service (ETS) a list of high school seniors, by zip code, who score above a certain level on their SATs. I use this to generate a mailing to all students above our 1100 guideline. Because this hasn't produced many students in the past, this year I'm going to address the letters to "parents of ..." and see if the response increases.

(2) Garden State Scholar search. Each year the State of New Jersey awards scholarships to high school seniors with high class standing and GPAs. I send them a letter offering to supplement their scholarship up to full tuition and fees if they enroll in the Honors Program.

(3) High school visits (1). I started calling on high school principals and guidance directors immediately after I was appointed Director. I've already mentioned the lukewarm response to the local

county college, even the Honors Program. However, I'm encouraged by the positive response of a few guidance directors, and will continue mailings, telephone contacts, and visits.

(4) High school visits (2), college nights. On those occasions when high schools invite college recruiters to visit, our College attends and on a few occasions I've gone along with the admissions people. In a room (gymnasium or cafeteria) filled with admissions people from elite colleges with well-known names or exotic settings, as well as well known colleges from the state, our county college display draws few inquiries, especially in the fall semester when hopes remain high for first choice schools. I haven't gone back since my first year on the job, but would like to see if I can find funding for a part-time assistant to do this kind of recruiting.

(5) High school visits (3), advanced placement. Through relationships with two guidance directors, I contacted two advanced placement program coordinators to discuss the Honors Program. One took the time to schedule a lengthy meeting, the other was not receptive to any follow-up visit. And the lengthy meeting has produced no results so far. When time allows, I may follow up on this avenue, but the original Honors Program Director discouraged much effort here. He said the advanced placement people wanted someone to teach a class or two, but would not consider recommending the county college to their students.

(6) High school Bridge Program. The College has what it calls a Bridge Program, which allows qualified high school students to take College courses to earn college credits and, if the high school

allows, credit for high school graduation at the same time. I've publicized the program to high school guidance directors, emphasizing Honors Program courses, especially the laboratory science courses and basic freshman courses, which at our College can provide small, nurturing sections of courses that, at larger four-year institutions are often offered in large sections in a threatening, impersonal environment.

(7) High school parent-teacher organization visits. On the recommendation of one high school principal, who said he and his guidance counselors were convinced of the merits of our program, but that the parents weren't, I've begun contacting presidents of the PTO/PTAs to speak to their organizations. Like some high school guidance counselors, some PTO/PTAs aren't interested, but enough are that I'm continuing the efforts here, believing that, over time, such contacts may begin to change people's perspective on the Honors Program.

(8) Lecture Series. For the past two years, we've offered a lecture series in conjunction with our two-semester humanities sequence (HRS 101-102), which brings to the College teacher-scholars from elite schools so students can experience the kind of instruction they will receive when they transfer. The series also provides a showcase to demonstrate to the community the kind of instruction going on in our Honors Program. Lecturers from Princeton University, Princeton Theological Seminary, Columbia University, Rutgers University, Georgetown University, and Drew University have all received very favorable notices. One serendipity occurred when Shirley Tilghman, a professor from Princeton University's

Department of Molecular Biology, who had been working on the human genome project, came to lecture on the ethics of genetic research the day after the story of the cloned sheep, Dolly, broke in *The New York Times*. Dr. Tilghman had been one of the readers of the Dolly paper and had recommended it for publication. The lectures have accomplished their primary purpose, to expose our students to the quality of instruction they can expect when they transfer. And the lectures have also begun to make an impression in our community, an impression designed to improve the image of the Honors Program and the College.

(9) Advertising. We have no sustained systematic advertising campaign in place for the Honors Program. The College recently hired a new public relations director who says she'll give some attention to our program when she works through some other priorities. This seems a crucial component of any effective recruiting program, so I'm anxious about how to proceed here in the face of her apparent lack of interest in giving the Honors Program a high priority in her budget.

Results

Enrollment is up slightly this year, but only because we have offered more honors courses and sections than ever before (new honors courses in logic and critical thinking, writing the research paper, biology, freshman composition, history, and psychology, as well as the four previously existing "HRS" courses), with a total enrollment beginning to approach that of the early years of the

program (65-70 students enrolled in honors courses, but only about a dozen matriculated in the Honors Program). However, average enrollment per section is not yet up to double digits, and this spring we had to cancel one of the previously existing sections, an evening section of a two-section course, because only four students enrolled.

Initial results indicate that the most efficient means of recruiting, at Union County College, now, is the in-house operation. This operation has produced the majority of our honors program students. After two years on the job, I can point to only three students who have come into the program directly from two high schools in the county. Talking to other Honors Program directors around New Jersey and at national conferences of the National Collegiate Honors Council, I learned that many other programs have been able to establish fruitful relations with local high schools. I haven't been able to do that yet. Whether that results from the large number of four-year schools nearby, the desire of many students to "get away," to parents wanting their children to attend prestigious schools, or just to our not doing an effective public relations job I don't know yet.

But the enrollments are up, if only slightly, and two guidance directors have called about specific students to set up interviews. So, overall, I'm encouraged. I'll continue to visit high schools, but will also insure that the in-house mailings and follow-ups get maximum effort, simply because that's where the majority of the students come from. We need excellence in teaching-learning techniques, nurturing mentoring, and quality courses in several disciplines. But it's recruiting that makes of breaks the program.

[1] To earn a degree in the Liberal Arts/Honors Program students took four "HRS" courses and completed honors contracts in at least three other courses. The HRS courses included a two-semester humanities course (HRS 101-102) that covered major Western texts in philosophy, religion, science, literature, and the visual arts, emphasizing students' critical thinking skills. The third semester course (HRS 201), which varied in instructors and specific content each year, was a seminar focusing on the interaction between technology and social attitudes toward science, technology, values, and ethics. Finally, students completed an independent study (HRS 202) with a faculty member in a topic of the student's choice.

[2] Students were recruited from those who had already applied to or been admitted to the college. The criteria for admission to the program, or into the HRS courses if not in the program, included a GPA of about 3.5. Recruiting in the high schools was never attempted on a sustained systematic basis.

[3] The main campus is in a suburban setting in Cranford, surrounded by upper middle class communities and occupying a 48 acre site with several buildings of some 240,000 square feet. Urban campuses are in Elizabeth (one seven-story building of 102,000 square feet; it's already full and another building is being planned) and Plainfield (two buildings of 40,000 square feet). A majority of students (60%) attend classes at the Cranford campus. Two-thirds (64%) are female and somewhat fewer (60%) are white, both with some variation among the campuses.

[4] New Jersey population grew 5% from 1980 to 1990 and is projected to grow another 4.7% by 2000 (to over 8,000,000). Union County population decreased 2% from 1980 to 1990 and is expected to increase only 0.3% by 2000 (to 495,500). The largest decrease (35%) occurred among those under age 19, the largest increase (35%) among those age 65 and older. The percentage of Hispanics and Asian/Pacific Islanders increased from 1980 (10%) to 1990 (17%) and is expected to increase more by the year 2000 (22%). The percentage of the Black population remained and is expected to remain relatively constant (16%, 18%, and 18%). White population decreased from 1980 (74%) to 1990 (65%) and is expected to decrease by the year 2000 (59%).

Employment has increased in services, finances, insurance, real estate, transportation, communication, and public utilities, and decreased in manufacturing and public administration. Future job growth is expected in the health services, the pharmaceutical industry, and the transportation industry (with the expansion of air cargo facilities at Newark International Airport). Average income in 1990 in the 20 major towns in the county ranged from a low of $28,802 to a high of $75,122, with a median income throughout the county of $41,791. *Union County College Strategic Plan, 1995-96 to 1997-98.*

The College's mission includes providing programs to facilitate transfer to four-year institutions, facilities and faculty are adequate, but enrollment patterns are a major consideration. From the mid-80s through 1994, enrollment steadily rose (peaking at 7617 FTEs in 1994). Since then enrollment has steadily decreased (to 6750 FTEs in 1997). Interestingly, the Liberal Arts/Honors Program never had many students (it peaked at 14 in 1994), but the HRS courses always attracted enough students to keep the enrollments comfortably in double-digits, sometimes above 20.

[5] There are 18 public and 10 private high schools in the county. Most parents and students at several (generally upper middle class) would prefer not to be associated with the local community college. At several other high schools (generally lower middle class) some parents don't see any reason for their children to attend college at all. In general, the more affluent the community, the less likely their children will attend Union County College directly from high school. However, we attract several from those schools who first try a competitive four-year institution, do poorly, and come home to lick their wounds and mature. But we don't see those students until a year or two after they graduate from high school, and then only if they apply to our college and take the basic skills test, where their high scores bring them to my attention.

[6] Interestingly, similar reports from predominantly lower middle class high schools list only college acceptances with no listing of class rank and usually include local, New Jersey schools as well as an occasional Tier One school.

[7] We do get some other students from the community because of word-of-mouth and occasional advertising, but not a significant number.

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For Professor Theodore K. Rabb
History Department
Princeton University
Spring 1998

Multimedia
by Brian J. Pankuch

Brian Pankuch
Princeton University
Spring 1998

Multimedia in Lectures and on The World Wide Web.

Abstract:
How effective and efficient is the use of multimedia for learning in lecture and on the Internet? Most results are anecdotal and show positive outcomes, with students being enthusiastic about new methods of learning. It appears that most of this effect can be ascribed to using multimedia methods students are not familiar with (Hawthorne effect). No proof was found that multimedia learning is more efficient, i.e., that more is learned during the same time spent studying. Students did spend more time with the multimedia, so they learn more due to the increased time spent not because multimedia is inherently more efficient. This does not make the additional learning less meaningful.

It does suggest that a model for developing and using multimedia should include an awareness that the effect of 'new' multimedia may be short term. Development models should include the easiest ways possible of updating substantial parts of multimedia to include the newest and best material.

My intention is to explore the effectiveness and efficiency of multimedia in teaching chemistry, particularly its use on the World Wide Web (WWW). By multimedia I mean text accompanied by illustrations, graphs, simulations, animations, etc. Hypermedia, the ability to link a given page of material with other material is generally part of most multimedia packages. I'm principally addressing the effectiveness of this technology both in lecture and on the web not the advantages of new modes of 'distance learning'.

Most of us don't have the time (or perhaps the expertise) to develop teaching packages. We can, however, preview textbooks and their supporting materials. A number of publishers are beginning to include CD's filled with material. Some include an outline of lecture notes with demonstrations and additional multimedia material. So as this is written in early 1998 we begin to have packages available so we don't have to be multimedia experts in design and general computer expert to use multimedia in lecture. We have a number options for bringing multimedia material to our lectures.

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Such as using rooms set up for multimedia display, or carrying a laptop and portable projector into the lecture.

Full access to WWW plus ability to use material on a publisher's CD's in any order we wish and our own Powerpoint lecture notes would likely open a number of possibilities in learning most of us don't use now. Although there are many possibilities for how the equipment can be supplied, I'll just mention my personal preference based on 30 years of working with instruments and computers is to have my own laptop for my material. Sharing a computer for this type of work is possible but very difficult. I'd just as soon have a shared projector in my own department, again more control.

I'm basing this on recent experiences at Princeton University as well as my college where we had some problems keeping equipment working, and especially trying to get material live off the WWW.

I've tried to find well done research studies rather than anecdotal material to support or negate using multimedia and hypermedia for more effective learning. Generally I've come across of requests for massive research into how people learn. In other words we haven't proven that multimedia is more effective. Many users think it is and students appear to like it better, but do we know that it is more effective? Multimedia itself may be a means to more effective learning, by itself there is no assurance of increased learning.

Performance generally improves when the way material is presented is changed. This Hawthorne effect is known in psychology. For instance if a professors' lecture method is changed improved learning will probably occur. A 'reasonable' change causes an improvement in student learning. Students study harder when they perceive the professor is giving them attention that seems special. The increased learning falls off as the new methods become the norm. It's important to keep varying the course to keep it from getting stale. To keep experimenting to keep it a little bit new. So it is quite likely that many effects attributed to multimedia are going to be short term or ineffective as more students find it to be the norm. But are there aspects of multimedia which are more effective-learning the material long term?

Although much of what evolves below was done with K-12 in mind, most of the generalizations appear applicable at many colleges. Previous attempts to incorporate technology have been less than terrifically successful for a number of reasons:

From project 2061
Materials and Technology

> Previous technology reforms have almost always been hardware-driven and have largely ignored the content and structure of the curriculum they deliver. Therefore, the use of many technologies with potentially great educational value have followed a similar pattern: first, they are introduced with great fanfare and anticipation of the powerful impact they will have on student learning; then they are eagerly and hurriedly introduced into classrooms with little emphasis ever having been placed on examining their content or defining their

role, and even less emphasis on training teachers to properly use them; and finally, their weaknesses are soon revealed to students, teachers and parents, and they are shelved permanently, their potential power forever wasted.
... Technology and media innovation in American schools has been characterized by cyclic fads and a failure to use the sound tools and processes of science to systematically and progressively improve the quality of instruction. As we enter the 21st century, technology has become a far too powerful and valuable learning tool to allow this pattern to repeat. [1]

Just transferring age old lecture notes to Powerpoint, Astound or some other presentation software will not likely increase learning. Nor does our average student necessarily need a great deal more information, they need to learn how to use information effectively. How to use it to solve problems.

... For decades, cutting edge technologies have been touted as groundbreaking boons to American education. But despite the optimism that frequently accompanies the introduction of new technologies into American classrooms, research on their use in schools has found a pervasive cycle of inappropriate use followed by disappointment and abandonment (Cuban, 1986). Perhaps the main reason for the repetition of this cycle is that when instructional "innovations" that use new technologies are introduced, the focus has centered on the lure of the new hardware and its ability to process or deliver information faster, in greater quantities, and from greater distances, rather than on the quality of instruction that the hardware carries or supports. These are hardware-driven, rather than content- or instruction-driven, reforms.

Hardware-driven reforms are doomed for three major reasons. First, they assume that technology alone will improve student learning, ignoring how it might actually produce affective and cognitive results. Second, because the hardware is assumed to make the difference (as opposed to the teaching or the quality of its software), new hardware tends to be introduced into classrooms hurriedly on a wave of enthusiasm and public support, but with little time and few resources devoted to training teachers to integrate the hardware into their curriculum. Third, because technology is often hurriedly introduced, its role and purpose in instruction is usually left undefined. These severe problems cannot be solved without drastic changes in current practice by the producers and marketers of hardware, in the research on educational technology, and in the ways schools select and implement hardware.[1]

We are currently in a similar rush to keep up, to do the new because our competitors are doing it. With little regard to the effectiveness other than that it is new and other colleges may be more effective in attracting students (true). Of course sometimes just being new is enough to get a positive response from students even if they don't learn material any better.

... Although technology was important for providing access, these results were attributed in large part to the specific combination of pedagogy and curriculum organization in the program content.

... Teachers are, therefore, put in an extraordinarily difficult position. They are often charged with designing instructional materials to accompany technologies that they are not familiar with and whose educational purpose is often ill-defined. On the occasions when staff development does take place, methods for teaching with a new technology are often prescribed by individuals far removed from the classroom, and they have little relevance for the unique needs of each teacher's classroom. [1]

So if you don't have specific reasons to use new technologies tread carefully. If you don't have a need to show material not easily produced by cheaper means why are you changing? Keeping your job because the administration wants to try is a good reason, but may not be sufficient to increase student learning.

Many uses for the same technology may occur to each of us. We may very well be able to use instructional technology in innovative ways after tweaking it to our students needs.

> ... the machine alone makes no significant contributions to student performance.[1]

Well done research on the effectiveness of an entire package plus its implementation are difficult to come by. Even packages that are effective with some test groups may be less so with our students. Using a package and trying to separate out the material which works and changing what doesn't to be more effective is challenging, but rewarding.

> ... for decades researchers have studied whether one mechanical or electronic medium produced more student learning than another, with little reference to the educational context or pedagogical or curricular content of these media. Much of this research is confounded by uncontrolled variables, rendering it invalid and not replicable. A reasonable first step in future research would be to move away from comparing technologies or methods and begin to describe carefully the science teaching and learning situations in which technology has an impact on student performance and behavior. This research-based focus on observation, analysis, and synthesis of approaches that work would at the same time meet the need to tie technology to science content and provide science teachers with specific information about how to implement technology successfully.
>
> ... Effectively used technology would have three simple distinguishing characteristics First and foremost, technologies should provide quality education to students. There are numerous examples of effective applications of technology that not only are better than traditional approaches, but also offer unique learning opportunities. Collaboration via the Internet, real-time data collection, computer modeling, and image analysis are all examples of science learning that is either impossible or cumbersome without technology. An important distinguishing characteristic of these applications is that they focus on the specific combination of teaching and curricular organization resident in the content of the program, and on the subsequent benefits to students, rather than on the hardware that carries the application. In these examples, technology can be integrated fully into the curriculum so that all students gain an understanding of its nature, power, and limitations.[1]

A good step would be to have well researched and designed packages from publishers of the text, a combination of CD and an accessible webpage for constantly updated material. Well designed, but editable by the professor teaching the course to take account of the needs of the particular group of students at a particular institution. Training in how and why to make effective changes for different student groups would be helpful.

> ... The first and most important way in which research on the use of technology must change to support science education reform is to make student outcomes the primary measure of a program's effectiveness. Observations of teacher performance behavior, costs, and physical and social infrastructure are important in assessing a technology's

worth, but they are nonetheless secondary to that technology's ability to produce positive changes in cognitive and affective student.

Learning and teaching are going to be more deeply affected by the new availability of information than any other area of human life. There is a great need for a new approach in new methods, and new tools in teaching, man's oldest and most reactionary craft. There is a great need for a rapid increase in learning. There is above all, great need for methods that will make the teacher effective and multiply his or her efforts and competence. Teaching is, in fact, the only traditional craft in which we have not yet fashioned the tools that make an ordinary person capable of superior performance. (Heinrich, 1970, p. 56) 1 Along a similar line the "Report to the President on the Use of Technology to Strengthen K-12 Education in the United States" speaks to the need for definitive research to ascertain how people learn and how we can most effectively use technology to increase the ability to learn. Although the report doesn't deal directly with multimedia and hypermedia the call for meaningful research beyond anecdotal experience is clear.

Chaired by David E. Shaw, Ph.D.
Chairman, D. E. Shaw & Co., Inc. and Juno Online Services, L.P.
(David E. Shaw has a Ph.D. from Stanford in computer science and uses sophisticated computer modeling programs. He knows a lot about computers and what they can do.)

To some degree we need to know what we are trying to teach that goes beyond the important material of a discipline. Just facts and equations don't make the grade. Methods for learning new material has to be part of what we are teaching.

... it is widely believed that workers in the next century will require not just a larger set of facts or a larger repertoire of specific skills, but the capacity to readily acquire new knowledge, to solve new problems, and to employ creativity and critical thinking in the design of new approaches to existing problems.

... Initiate a major program of experimental research. The Panel believes that a large-scale program of rigorous, systematic research on education in general and educational technology in particular will ultimately prove necessary to ensure both the efficacy and cost-effectiveness of technology use within our nation's schools.

... should encompass (a) basic research in various learning-related disciplines and on various educationally relevant technologies; (b) early-stage research aimed at developing new forms of educational software, content, and technology-enabled pedagogy; and (c) rigorous, well-controlled, peer-reviewed, large-scale empirical studies designed to determine which educational approaches are in fact most effective in practice. The Panel does not, however, recommend that the deployment of technology within America's schools be deferred pending the completion of such research.

...Section 8 focuses on the need for rigorous scientific research designed to evaluate the effectiveness and cost-effectiveness of alternative approaches to the use of technology in education, on the extent to which such research should be funded at the federal level, and on the manner in which it might best be organized and administered.[2]

So here are two national studies who conclude that technology might help, but call for substantial research to find out what will work efficiently. There are lots of anecdotal stories about successes, but not controlled well designed studies. We seem to be flying blind, as to what technology works long term to increase learning. So at this point we can't say definitively that technology will increase learning. We need to do more well designed research. We can't answer the question I started with.

We are, however, under a pressure to do something with this new technology. Areas such as multimedia and hypermedia and using the Web are popular with students and administrators. Funds are usually available. If nothing else the 'Hawthorne effect', using something new should increase learning and have the usual short term effect of increased learning. I'll go a little further and hope that combined with experience, an application of multimedia and hypermedia will have some longer term effect on learning. Perhaps tying the new methods to current learning theory would be beneficial. What do we mean by learning? The constructivist learning methods are close to what we do in some chemistry labs.

> ... (students) will thus need to be prepared not just with a larger set of facts or a larger repertoire of specific skills, but with the capacity to readily acquire new knowledge, to solve new problems, and to employ creativity and critical thinking in the design of new approaches to existing problems. In the words of Frank Withrow, the director of learning technologies at the Council of Chief State School Officers, "the US work force does not need knowers,' it needs learners.'"

> ... constructivists believe that learning occurs through a process in which the student plays an active role in constructing the set of conceptual structures that constitute his or her own knowledge base. [2]

We increasingly have the need to prepare students not just with the ability to solve a given set of problems. They will need to gain the abilities to use new technologies to better understand what the problem is to start with, and then discover how to solve it. So its not sufficient to know the gas laws, we need to see in a situation that gas laws could solve an inherent problem. For instance global warming is currently much in the news, but how do you measure the temperature of the globe? If it is primarily the atmosphere then perhaps we can apply the gas laws to get our estimate. There is a sizable jump between being able to plug numbers into the gas laws and being able to estimate the global temperature using these laws and experimental data. Or to judge how good are the calculations done by experts.

If simply using new multimedia hardware and software gives a transient increase learning then we need to address how do we use multimedia to be most effective. Its use must be part of a larger thoroughly researched plan. One currently popular philosophy is constructivism.

> ...Constructivist curricula often emphasize group activities designed in part to facilitate the acquisition of collaborative skills of the sort that are often required within contemporary work environments. Such group activities may offer students of varying ages and ability levels, and having different interests and prior experience, the opportunity to teach each other a mode of interaction that has been found to offer significant benefits to both tutor and tutee. Explicit attention is also given to the cultivation of higher-order thinking skills,

including "meta-level" learning the acquisition of knowledge about how to learn, and how to recognize and "debug" faulty mental models.

... the proposition that constructivist techniques, as currently understood, will in fact result in more favorable (in some sense) educational outcomes must still be regarded as largely (though not entirely) a collection of exciting and promising hypotheses that have yet to be rigorously confirmed through extensive, long-term, large-scale, carefully controlled experimentation involving representative student populations within actual schools. While the foundations of constructivism provide a rich source of plausible and theoretically compelling hypotheses, the fact remains that the question of how best to teach our children remains an empirical question that has not yet been fully answered.[2]

The combination of a constructivist method that may work well plus the effect of new technology which even if it is not more effective long term will give a boost in learning due to the 'Hawthorne" effect. Although preliminary research makes technology and constructivist approach look promising many questions remain.

... for careful research on the ways in which computing and networking technologies can be used to improve educational outcomes and the ratio of benefits to costs. The majority of the empirical research reported to date has focused on traditional, tutorial-based applications of computers. Several meta-analyses, each based on dozens of independent studies, have found that students using such technology significantly outperform those taught without the use of such systems, with the largest differences recorded for students of lower socioeconomic status, low-achievers, and those with certain special learning problems. While certain methodological and interpretive questions have been raised with respect to these results, the most significant issue may be the question of whether the variables being measured are in fact well correlated with the forms of learning many now feel are most important.[2]

Students who spend more time learning and solving problems in a given area generally do better on tests. In particular if you have created the material, such as a multimedia presentation, students using it have a better idea of what you consider important and what is likely to be on your test. A given use of multimedia or other technology may also give better results because it is new and interesting and students spend more time with it, not because it is more effective. Most of us will happily accept improved learning due to increased time spent on the material, but the multimedia will only be new for a short period of time. *If there is a truly more effective way of using multimedia -i.e., four hours spent using it shows more learning than four hours using usual methods then we have a more efficient, long term approach to learning.*

... Although some interesting and potentially promising empirical results have been reported in the literature, a substantial amount of well-designed experimental research will ultimately be required to obtain definitive, widely replicated results that shed light on the underlying sources of any positive effects, and which are sufficiently general to permit straightforward application within a wide range of realistic school environments.
... researchers, educators and software developers can be expected to develop content and techniques that optimize student performance with respect to whatever criteria are employed to measure educational attainment, progress within the field of educational technology will depend critically on the development of metrics capable of serving as appropriate and reliable proxies for desired educational outcomes.

... 1. Basic research in various learning-related disciplines (including cognitive and developmental psychology, neuroscience, artificial intelligence, and the interdisciplinary field of cognitive science) and fundamental work on various educationally relevant

technologies (encompassing in particular various subdisciplines of the field of computer science).

2. Early-stage research aimed at developing innovative approaches to the application of technology in education which are unlikely to originate from within the private sector, but which could result in the development of new forms of educational software, content, and technology-enabled pedagogy, not only in science and mathematics (which have thus far received the most attention), but in the language arts, social studies, creative arts, and other content areas.

3. Rigorous, well-controlled, peer-reviewed, large-scale (and at least for some studies, long-term), broadly applicable empirical studies designed to determine not whether computers can be effectively used within the school, but rather which approaches to the use of technology are in fact most effective and cost-effective in practice.[2]

Not just the technology but how to use the technology to make learning more effective.

...The Panel also believes, however, that a large-scale, rigorously controlled, federally sponsored program of research and evaluation will ultimately be necessary if the full potential of educational technology is to be realized in a cost-effective manner. Data gathered systematically by individual states, localities, school districts, and schools during an initial phase of federally supported educational technology efforts could prove invaluable in determining which approaches are in fact most effective and economically efficient, thus helping to maximize the ratio of benefits to costs in later phases. Federal funding will ultimately also be required for research aimed at analyzing and interpreting this data.[2]

The Teaching Web: A Guide to the World Wide Web for all Teachers
Ron Owston

... As we've just seen, there's plenty of evidence that the Web is a valuable means to increase access to education. Evidence on how it can promote improved learning is not as forthcoming. In fact, there's an on-going debate in the instructional design research literature about whether there are any unique attributes of media that can promote improved learning. This debate stems from the observation that, after more than 50 years of research on instructional media, no consistent significant effects from any medium on learning have been demonstrated.[3]

Let's repeat that "after more than 50 years of research on instructional media, no consistent significant effects from any medium on learning have been demonstrated." I'm not sure what that means for multimedia, but it doesn't sound good.

... Some researchers go as far as to argue that no effect can possibly be demonstrated, because any improvement in learning that may accrue will come from the instructional design, not the medium that delivers the instruction.[3]

Delivery of material on the Web does have some advantages, though not everyone will agree.

... there are at least three distinct learning advantages to Web use.
1. Web appeals to students' learning mode
2. Web provides for flexible learning
3. Web enables new kinds of learning

Let's look at some actual experiments. First what is available for helping in lecture? Casanova reports using a microcomputer to project lecture material for Organic Chemistry. Note in this experiment that both groups of students spent the same time in lecture, and were tested with the same exams. The difference was the type of presentation in the lecture.

> "Students took very few notes, but listened and watched intently. Class participation (questions, comments, discussion) was high, of good quality, and stimulating. Students were very favorably impressed that they had a good understanding of the subject, particularly the visual representations of molecular structure. However, very poor performance on conventional examinations did not support this assertion. A control section (taught by Professor Stanley Pine) took all the same examinations on the same days as did the experimental section. There was a striking difference in result between the experimental section and the control section, with the experimental section performing more poorly in all categories of test items. The overall average in the course for students in the experimental section was 44%, contrasted with 63% for the control section."

Casanova, J.;"Computers in the Classroom- What Works What Doesn't"; Computers in Chemical Education Newsletter. 1996, Fall, **5-9.** [4]

What results in the best learning for our students? That we spend considerable time and effort making and using tools that may help them learn or spend the time directly with them in the more traditional methods? Of course it's not an all or nothing answer. Most of us don't have the time to go one on one with each student in person nor do we have time to become multimedia experts.

It is estimated by a number of implementors of multimedia in their lectures that a 4-6 times increase in preparation time is needed to make enriched materials. So the enriched material engaged students interest in lecture which is great, but the interest did not, in this experiment, translate into test measured learning. Plus there was a lot of time spent in developing the material.

> Engines of Inquiry: Asking the Right Questions: What Does Research Tell Us About Technology and Higher Learning?
>
> By Stephen C. Ehrmann, Annenberg/CPB Projects
>
> "I've got two pieces of bad news about that experimental English comp course where students used computer conferencing. First, over the course of the semester, the experimental group showed no progress in abilities to compose an essay. The second piece of bad news is that the control group, taught by traditional methods, showed no progress either."
>
> --from a talk by Professor Roxanne Hiltz at the New Jersey Institute of Technology on an early use of computer conferencing. [5]

Can we just assume that using technology such as multimedia is going to improve learning?

> ... they were asking whether a technology could be used to teach without specifying anything about the teaching methods involved.

Richard Clark responded to that type of assertion by arguing, in effect, that the medium is not the message. Communications media and other technologies are so flexible that they do not dictate methods of teaching and learning. All the benefits attributed by previous research to "computers" or "video," Clark asserted, could be explained by the teaching methods they supported. Research, Clark said, should focus on specific teaching-learning methods, not on questions of media. [5]

Just as unlikely that technology is going to solve learning problems by itself so is the generalization that it doesn't matter what technology you use.

... Robert Kozma argues, for example, that the particular technology used is not irrelevant, but may be either well or poorly suited to support a specific teaching-learning method. There may indeed be a choice of technologies for carrying out a particular teaching task, he argues, but it isn't necessarily a large choice. There are several tools that can be used to turn a screw, but most tools can't do it, and some that can are better for the job than others. Kozma suggest that we do research on which technologies are best for supporting the best methods of teaching and learning. [5]

Why haven't individual disciplines found breakthrough programs that make a substantial contribution to learning?

...We wanted to understand why a few software packages had proved to be viable, while so many others were not. There are many reasons for this. Support services are often under-funded, so faculty can't be certain that the basic hardware and software will consistently be available and in working order. Changing a course involves shifting to unfamiliar materials, creating new types of assignments, and inventing new ways of assessing student learning. It's almost impossible for an isolated faculty member to find the time and resources not only to do all these things, but to take all these risks. Few institutions provide the resources and rewards for faculty to take such risks. For these and other reasons, the pace of curricular change is slow.

We did discover a few small families of curricular software had found a niche. However, many of these packages gained use because they were familiar and inexpensive to develop (and thus inexpensive to update regularly). They got into use by being comfortable, not by making instructional waves. Hardly the stuff of revolution. [5]

Some of the best software is very general in nature.

..."Worldware" is the name we gave software that is developed for purposes other than instruction but also issued for teaching and learning. Word processors are worldware. So are computer-aided design packages. So are electronic mail and the Internet.

Worldware packages are educationally valuable because they enable several important facets of instructional improvement. For example, on-line libraries and molecular modeling software can support experiential learning, while electronic mail, conferencing systems, and voice mail can support collaborative learning by non-residential students.

Worldware packages are viable for many reasons: they are in demand for instruction because students know they need to learn to use them and to think with them; faculty already are familiar with them from their own work; vendors have a large enough market to earn the money for continual upgrades and relatively good product support; and new versions of worldware are usually compatible with old files, thus, faculty can gradually update and transform their courses year after year without last year's assignment becoming obsolete.

For reasons like these, worldware often has proved to have great educational potential (value) and wide use for a long period of time (viability). Has that educational potential

been realized in improved learning outcomes? There is no substitute for each faculty member asking that question about his or her own students. Here are two such studies.[5]

Individual uses for the general type of software make creation of specific materials for a class more practical.

> ... he used worldware to create an animation that enabled him to teach the same material (about a complex series of interactions in biochemistry) in half an hour. The students could also study the computer-based animation outside class, frame by frame if needed. "I was initially disappointed," he told me the day I visited him at Dartmouth, some months afterward. "There was very little excitement or discussion when I showed it in class. But later, when I gave them my regular exam on the subject, they did better than any previous class."[5]

Unfortunately this experiment left out many details such is how much did the students use the animation out of class? One disadvantage of writing your own material is that although it is creative to write your own software it is an enormous time investment and the results are limited. It takes much less time using a program you are familiar with and just use it.

> ... Thus, to make visible improvements in learning outcomes using technology, use that technology to enable large-scale changes in the methods and resources of learning. That usually requires hardware and software that faculty and students use repeatedly, with increasing sophistication and power. Single pieces of software, used for only a few hours, are unlikely to have much effect on graduates' lives or the cost-effectiveness of education (unless that single piece of software is somehow used to foster a much larger pattern of improved teaching).
>
> ... 1. Technology can enable important changes in curriculum, even when it has no curricular content itself. Worldware can be used, for example, to provoke active learning through work on complex projects, rethinking of assumptions, and discussion.
>
> 2. What matters most are educational strategies for using technology, strategies that can influence the student's total course of study.
>
> 3. If such strategies emerge from independent choices made by faculty members and students, the cumulative effect can be significant and yet still remain invisible. (Unfortunately, the converse can also be true. We may be convinced that we have implemented a new strategy of teaching across the curriculum, and yet be kidding ourselves.) As usual, there is no substitute for opening our eyes and looking.[5]

Stephen Ehrmann doesn't believe it is possible to have generalizations about how new technology works in all colleges He asks if it is more appropriate to set up tools for evaluating strategy we use with our own students. Find methods that seem to work in similar colleges, then customize for our own students. He also sees big effects not just from doing something in a given class, but how it expands when something like word processing or email are used college-wide.

> Ordinarily what matters most is: - not the technology per se but how it is used, - not so much what happens in the moments when the student is using the technology, but more how those uses promote larger improvements in the fabric of the student's education, and - not so much what we can discover about the average truth for education at all institutions but more what we can learn about our own degree programs and our own students.[5]

Few colleges have been willing to spend money to actually carry out evaluations of the effectiveness of using technology. There are many reasons for deciding not to do in depth evaluations. Not the least of is difficulty in making critical measurements in a fast changing environment.

- evaluation costs money and time,
- it may take months, even years, to develop a convincing picture and decisions are (always) pressing,
- changes in technology are so great that yesterday's investment in technology, no matter how successful or unsuccessful, can seem irrelevant to tomorrow's budget,
- and the possibility of meaningless or threatening findings, either of which might put the instigator at personal risk. [6]

For an opinion from Ewing at Yale Using Computers in Chemistry and Chemical Education

> Computer projection can add a great deal to the presentation of technical matter and is an aide to instruction. Besides being easily produced (once the software mastered!), computer graphics often are better at holding an audience's interest than are traditional presentations. Projection is suitable for the largest lecture halls, especially with multiple TV monitors. During preparation, graphic elements are easily stored and reused, changes are easily incorporated, and external resources (images, animations, or audio) may be added. Interactive operation, including network access adds dramatic value and richness to instruction and allows instructors to adapt particular questions and problems that come up during class time.
>
> ... World Wide Web. The WWW, or "Web", offers another one-to-many communication channel. Faculty may create a set of Web pages on a Web server for class assignments or to provide needed information resources. Most Web browsing software (Netscape, Mosaic, etc.) has the advantage of handling images, animations, other types of data, and can provide a convenient "shell" (command entry system for access to other information services (FTP, gopher, telnet, news, etc.) At a sophisticated level, the Web may be used for forms-based data entry and secure transactions, which might include collecting homework, registering for sections giving exams.
>
> ... While few faculty are potential authors of multimedia textbooks, many could use the technology to prepare better lectures and materials for their own classes. Since computer software, such as Microsoft PowerPoint or Aldus Persuasion, is relatively easy to learn and inexpensive for still-projection images or to provide live media display. More elaborate tools, such as MacroMind Director or Adobe Premiere, are available for animation and video. Some faculty are writing Web pages and even using their personal computers as Web servers.
>
> ... The Automated Laboratory
>
> The chemistry laboratory is increasingly dominated by computer-controlled instruments and digital data management, as described in other chapters. New opportunities for laboratories in education open up when laboratories are integrated with the campus computing environment. Primarily, this means giving labs full access to, and availability from, the campus data network. Lab students using personal computers or workstations can have access to information and computing resources to, for example, retrieve chemical data or literature, analyze molecular models,
> perform reaction or process simulations on remote machines. [7]

From a chemistry instructor (Carolyn Sweeny)who worked with available programs.

> ... One of the programs depicts mechanisms in motion—a vast improvement over the printed page and much better than watching an instructor with waving arms attempting to show an SN2 mechanism. This software represents an excellent use of the computers provides explanations not possible on the printed page, and it doesn't grow tired as a teacher might making something move. None of the software used is very expensive some has come from the Internet freely dispensed. [8]

Russell and Kozma used a prototype multimedia computer program to teach some challenging concepts . Effectiveness was measured by giving a pretest to assess the students level and a posttest given after two lecture periods of using the computer program. Student responses were coded for content by a trained graduate assistant not involved in the design of the chemical content for this project. 34% of the students gave satisfactory answers on the pretest and 56% on the posttest. About 50% of the students showed serious misconceptions on the pretest, only 20% on the posttest.

> A prototype multimedia computer program discussed below, Multimedia and Mental Models in Chemistry (4M:CHEM), utilizes modern technology to make the classroom more interactive, stimulating, and able to assist students in building accurate mental models for chemical concepts and phenomena. The 4M:CHEM software allows students to participate in selecting experiments to test or illustrate ideas, in selecting parameters for variables in experiments, and in selecting viewing modes for observing outcomes of experiments. Both qualitative and quantitative experiments are included to assist the student in building chemical understanding and intuition as well as developing quantitative problem solving abilities.
>
> In summary, college students come into chemistry courses with an incomplete or inaccurate understanding about characteristics of chemical systems at equilibrium and about the influence of temperature and pressure on equilibrium. An initial assessment of 4M:CHEM in two lecture sections for two one-hour presentations showed an increase in students' understanding of characteristics of systems at equilibrium and the effects of temperature on these systems. [9]

Unfortunately they don't compare these results with those obtained by teaching similar students with traditional lecture methods. So learning occurred but it may be at the same rate as usual.

Roger Schank a longtime developer of multimedia feels the real potential and challenge is building systems that actively engage the user.

> Most multimedia programs fail because they merely add video and graphics to page-turning programs. It does not matter whether that next page is text, graphics, or video, because the student is not doing anything. Consider remote-controlled television, which is a type of multimedia computer.
>
> ...Creating educationally effective multimedia programs taking seriously the idea of learning by doing. Good educational software is active, not passive, and ensures that users are doing, not simply watching.

...If we wish to profoundly change education, to make our schools better and our businesses more competitive, and we recognize the value of doing this through computers, we also need to understand what it means to create high-quality educational software. Our experience in building educational software for multimedia systems led us to formulate a number of principles about how to build educational environments in schools and in the workplace:

...Learn by doing. Learning should center on a task that requires the skills and knowledge we want to teach. The task should be challenging, but within a student's ability.

...Problems, then instruction. Students respond best to instruction when what they hear from the teacher relates to problems with which they are struggling. This method will teach students to associate the correct solution with a problem they may encounter in the future.

...Tell good stories. Students respond to compelling stories. Software must have good and timely cases that relate to students' problems.

...Power to the student. The student should control the educational process. The recommended path might be marked, but students should possess the power to determine or change the next step.

...The software is the test. Since the software we are talking about lets students do certain things or discover certain answers, the test is in whether the student demonstrates a new ability or makes a discovery.

...Find the fun. An instructional designer's job is to make learning fun, which means that students will enjoy what they are doing. If the instruction was designed correctly they will learn.[10]

Find the fun, a good thought to close with.

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Using Multimedia for Teaching Analysis In History of Modern Architecture

Abstract: The purpose of this research is to present a case for the development and support of a computer based interactive multimedia program. This program is for the teaching of analysis in a History of Modern Architecture course. The importance of analysis in architecture design will be emphasized as an effective strategy for the teaching of higher-order thinking skills. This project is important in the Community College Architecture design program because these are the skills which senior schools of architecture look for in potential transfers. Recent publications will be cited for strengths and weaknesses that point to the need for a multimedia approach to analysis in architecture design and this particular course. Analysis will be defined and a Lecture Schedule for the fall 1998 will be presented to show how the use of this program will be integrated within the framework of the semester. The support required to properly develop an interactive multimedia program will also is outlined.

Content:

The importance of analysis in architecture design

Interactive Multimedia

Defining Analysis

Publications

Approaches to analysis

Pedagogy

Support

Analysis project

Lecture Schedule

Sources

History 520 - Princeton University
Garry Perryman Mercer County Community College

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Multimedia for Teaching Analysis in History of Modern Architecture

Analysis of existing buildings is a primary educational approach used in most architecture design programs to teach the basic vocabulary and grammar of design. As a pedagogical strategy analysis more than any other exercise teaches students not only the language of architecture but also higher level thinking skills such as problem solving and creativity. The recent publication of a number of texts dealing specifically with the analysis of architecture has added to the sources that instructors and students can turn for design analysis. While these publications define the elements or systems to be analyzed and some provide a methodology they are not explicit in either. That is while defining elements, and there is little agreement on what those are, they do not give an explicit methodology, usually just examples of the concepts or diagrams and they become quite confusing for the beginning design student.

Given that the educational system K through 12 does not provide an adequate preparation for students entering architecture design curriculums, the main goal of the beginning design curriculum is to bridge the gap between entry level skills and those required in the professional design curriculum. This task is more important in the Community College Architecture design programs because these are the skills which senior schools of architecture look for in potential transfers. These are the higher level thinking abilities in the cognitive domain, analysis, synthesis and evaluation.

The pedagogical importance of analysis in beginning design studios cannot be overstated. The proceedings of the annual National Conference on the Beginning Design Students, articles in the Journal of Architecture Education and many studies of architecture design studio teaching attest to this importance. (Perryman 1989) It is also important though that analysis be taught with very explicit goals in mind to facilitate learning. It is the objective of this proposal that these goals can be greatly enhanced by the development of an interactive Multimedia computer based program. Such an interactive Multimedia computer based program would not only assist the instructor in

demonstrating the concepts of analysis but also provide access for students to images and self paced demonstrations of analysis.

Interactive Multi-media

Multimedia instruction is the use of the computer to present and combine text, graphics, audio and video, with links and tools that let the user navigate, interact, create and communicate. [The Impact of Information Technology on Instruction and Learning; Univ. of Texas at Austin]

We are being told that the use of multimedia, the computer, in the classroom has the potential to revolutionizing teaching and learning. The use of computers in teaching and learning has not proven significantly effective. So to create an interactive Multimedia computer based program without the promise of a more effective results would seem a waste of time. But using multimedia for presentations and as a source of images for students in the course History of Modern Architecture could have certain advantages. History of Modern Architecture requires the use of visual aides mainly in the form of 35mm slides. This assembling of slides for each lecture is itself a time consuming task. A number of CD-ROMs, computer based references, on architecture published in the last few years offer good sources for images and biographical knowledge of either a single architect or a compendium of architecture history.

With the simplified nature of many authoring programs assembling images for a lecture for multimedia is much the same as slides. The Multimedia computer integrates all of the existing media modes into one interactive presentation medium. The computer as the controlling factor distinguishes multimedia from those past modes such as overhead, slide, movie, and audio 'projectors'. These programs have the added benefit of allowing for the importation of movies and audio in the presentation. Multimedia programs can not only be used in the lecture and assist the instructor in demonstrating the concepts of analysis but also provide access for students to an image bank for further study.

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The capabilities of the computer for formal analysis in architecture are especially exciting. Computer animations can demonstrate concepts of analysis in an interactive way that allows the student to repeat the concepts until they fully understand them. Students can also see how the same concepts relate to historically significant designs. The advantages of computer based interactive learning is the accommodation of self paced individual learning rate and repetition.

Defining Analysis

Bermudez and Grebner, in Teaching Analytical Thinking & Representation in Beginning Design, state that:

> *Analysis offers the traditional learning experience for understanding design by decomposing and discovering relationships and parts of the analyzed whole. As designers always intend a new synthesis of the world (design), they must become acquainted with the analytical task of taking the world apart and putting it back together.*

Analysis is an important skill and:

> *We do have many working systems for the study and analysis of the components of visual messages.*
>
> *There is a visual syntax. There are guidelines for constructing compositions. There are basic elements that can be learned and understood by all students of the visual media, artist, and nonartists alike, and that, along with manipulative techniques, can be used to create clear visual messages. Knowledge of all these factors can lead to clearer comprehension of visual messages.*
>
> A Primer of Visual Literacy, Donis A. Dondis

There are a number of types of analysis in architecture and a more specific definition is needed for clarification. Site, context and program analysis are typically pre-design collections of information, data, which inform design decisions architecture students and architects make in the creation of designs and do not concern us here. We

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are more concerned with building type, precedent and formal analysis as types of analysis that seek understanding of existing buildings that can also inform design decisions, but more importantly seek underlying principles of design after the fact. Building type, precedent and formal analysis is the types of analysis that is important in the History of Modern Architecture course. Through precedent analysis students are encouraged to critically assess and assimilate the spatial concepts and formal ordering systems of a given historic building.

Architecture design education is based on teaching that models behaviors of architects in practice. Analysis is an important skill required of architects. Teaching formal precedent analysis is best assigned in history of architecture courses. The history course provides the broader context, from which the prototype, building was drawn form. Throughout the history of modern architecture design, practitioners and theorist in the creation of architecture have applied analysis to models that illustrate the spatial concepts and formal ordering systems of the architecture designs.

Analysis is very important in modern architecture and the concept of modernism. Modernism rose out of the rise of scientific inquiry. In architecture this occurred in late 17th century France in the work of the physician architect Claude Perrault#. Perrault, given the task of updating the ancient authority on architecture, Vitruvius#, began what many historians believe as the theoretical beginnings of modern architecture. It is Perrault's [dissection] , analysis of architecture that expressed a new modern objective method of looking at architecture. Dissection attempts to understand the systems that underlie the nature of an animal or in this case [analysis] to understand the basic ordering system of a building. The need for Analysis of architecture has a long history of importance in Architecture education.

Publications

The recent publication of a number of texts dealing specifically with the analysis of architecture has helped add to existing sources that instructors and students can turn for definition and methodologies for design analysis. Architecture, form space and order, by Francis Ching, is one of the most widely used texts in beginning design courses. Ching

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defines many concepts and elements of architecture along with many examples. He does not provide a methodology for analysis though. Precedents in Architecture; by Clark and Pause also define the elements of architecture and provide full-page layouts of diagrams. They even provide a large number of extended concepts and diagrams across time but do not provide a methodology for analysis either. In Design Strategies in Architecture, G. Baker has defined elements or systems and a methodology , but this methodology becomes quite complicated. Architecture, form space and order, is presently used in a basic design course at MCCC for reference. Precedents in Architecture has been used as a reference for the History of Architecture course in the past but only seem to confuse students.

More recent books Analyzing Architecture, by Simon Unwin; and Design Analysis by Leupen, Grafe, Kornig, Lampe and De zeevw, are clearer in their definition of concepts for analysis but only Design Analysis sets up a method. This method is well worked out and would make a good text for the History of Architecture course.
It is because of the complexity of some of these methodologies that I believe there is a need for interactive computer based animation's to help with learning and understanding of analysis.

There are a number of computer based references on architecture published in the last few years. Most of these are very good sources for images and biographical knowledge of either a single architect or compendium of architecture history. None of these contain references to analysis although a CD-ROM based on the work of Louis I. Kahn, (Wiggins) does contain an animation, which explains the layering of Kahn's design of the Library of Phillips Exeter Academy. This Animation helps to clarify the conceptual basis of the design better than the diagrams of the same design in Precedents in Architecture by Clark and Pause. The CD-ROM also contains video and a contextual analysis, of the surrounding campus. It is this animation which more than any thing else expresses the way important but difficult concepts in analysis can better clarified.

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Approaches to analysis

There are two instructional strategies used in approaching analysis, the first that of discovery. Where the student is provided with only a statement of the problem, usually rather vague as to allow for different interpretations. The second strategy is a structured strategy that gives the student a list of principles to explore, a methodology of analysis, procedure and how the results are to be represented, drawings diagrams. The second strategy is in history course on Modern architecture.

Pedagogy

Bermudez and Grebner in Teaching Analytical Thinking & Representation in Beginning Design addressed the pedagogical importance of analysis in beginning design studios. They address Cognitive Learning Theory and the use of analysis projects in architecture design. They demonstrate that as a pedagogical strategy analysis teaches higher level thinking skills such as problem solving and creativity. They state that:

> *Design in architecture is the process of solving problems and creating, that which did not exist before. Design education differs from traditional education that teaches the acquisition of knowledge and then its employment. In design acquisition of knowledge is purposeful, , practical and meaningful in that it is needed to solve a design problem. That is, the acquisition of knowledge results from the need to know not from manipulation or study of given or taught knowledge. The practice of design tends toward developing the type of knowledge necessary to acquire or use knowledge or the development of contextual knowledge*

These are the higher level thinking abilities in the cognitive domain of analysis, synthesis and evaluation.

Bloom's Taxonomy also gives us evidence of the pedagogical significance of analysis as a higher level thinking skill. Bloom's Taxonomy for cognitive and affective domains, is an important part of a methodology of classifying of instructional objectives in the cognitive domain. The N.A.A.B.# refers to Bloom's Taxonomy in constructing their criteria for the evaluation of architectural schools for accreditation. Within these

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Taxonomies there are three domains of learning Cognitive, Affective and Psychomotor. Here the concern is with the cognitive domain as it pertains to analysis and architectural education. There are six levels of Bloom's Taxonomy with-in the cognitive domain which are hierarchical from simple, recall of information to more complex mental functions. These levels are knowledge, comprehension, application, analysis, synthesis, and evaluation. The other domains of Bloom's Taxonomy are also important in architecture education but are not considered here. Ching and others define the design process as a cyclical process of analysis, synthesis and evaluation, which are all higher levels of thinking.

Support for the production of multimedia:

The amount of preparation that goes into a lecture, content, producing overheads, or creating slides, even to ordering other media support from centralized media is time consuming. To produce a multimedia presentation takes even more time and expertise. The following is an outline of areas of expertise and support that is required to produce multimedia lectures and related courseware, such as CD-ROM or server based content.

Outline for Creating Multimedia for the Study & Analysis of Modern Architecture?

O Objectives
- Develop CD-ROM or Server based content to augment instruction in History and Theory of Modern Architecture Course to aid in learning.
- Establish an image bank reference.
- Establish examples and images/plans etc. for analysis of significant works Of architecture.
- Create animations to illustrate concepts of architectural analysis.

Creating a Multimedia Title

O Planning and designing your title
- What do you name it?

O developing the media effects
- What and how should the student interact with it?

O authoring the final title
- What is the Concept?

O Prototype the title
- See how students react to the title/concept

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Multimedia Production and Development

- O Design
- O Strategies
- O Authoring package
- O Multimedia materials
- O Equipment
- O Support

Design

- O titles that require specific audience responses
- O navigational jumps
- O questions to answer
- O other on screen elements

Strategies
Write a Specification
Plan the project
Think through every aspect

- O a complete specification explains
  - The audience.
- O Architecture students
  - And purpose for title
- O to express the past as a place students are connected with

Content:
History and Theory of Modern Architecture

- O Students read article-from Architectural Forum 1965 about LeCorbusier's death
- O Students can find more information via CD-ROM and Server as well as www.corbuarchive.com

Students select a Building for Analysis or develop plan in AutoCad

Students analyze plan in AutoCad

- o Students seek the fundamental elements, which the architect used in forming the building
- o the analysis poses many questions for the student as to the underlying formal aspects of architecture

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Authoring software and Multimedia materials

- o Macromedia Director
- o AutoCad

Equipment:
development

- o pentium 233mhz
- o 64MB RAM
- o 3 GB Hard Drive
- o 16 BIT Sound card
- o Video graphics adapter card
- • Zip drive
- • CD-ROM R/W

Equipment:
student access

- o Architecture Studio Lab w/20 computers
- o Pentium 100 Mhz
- o 32 MB RAM
- • 3 GB Hard Drive
- • CD-ROM DRIVE
- o Digitizer and mouse
- o Autocad R-14 software

The following lecture schedule is created to show the integration of analysis augmented with multi-media into the History of Modern Architecture course. The approach here is to focus on a particular element as that element orders the architecture of a specific time. A new element is studied as the development of architecture progresses until a mid-point in the semester where all the elements up to that point are applied to one of the seminal works of modern architecture, the Villa Savoye.

HISTORY of MODERN ARCHITECTURE AR-124 LECTURE SCHEDULE

WEEK

Required reading from Text Recommended Readings

1 Course Objectives Introduction Modern Classicism vs. The Project of the Modern Analyzing Architecture Robert Stern pp. Aaron Betsky pp.

Neo-Classical arch / Territorial and Technological transformations

Analysis: Paris and The Paris Opera [Program functional and symbolic aspects.]

2 William Morris & the Arts & Crafts Maybeck Morgan Greene & Greene

3 The Chicago School / Richardson and Sullivan

Analysis: The Guaranty Building, Buffalo, NY; Structure The load carrying elements and their relationship to the definition of function.

4 The Worlds Fair Mckim,Mead & White / The Ecole des beaux arts methodology of design / Garnier & Perret

Analysis: Parti

5 Early F.L. Wright

Analysis: Exploding the Box Axis The implied line(s) of composition.

Art Nouveau Horta Gaudi Mackintosh & the Vienna Secession Loos & Van de Velde

Analysis: Horta Circulation: The path of movement through the building.

6 The Werkbund / The Futurist, The Bauhaus and Walter Gropius

Analysis: The Bauhaus hierarchy: formal and programmatic

7 Mies van der Rohe / De Stijl & Rietveld

Analysis: The Barcalona Pavilion

Structure: and the definition of the space.

8 Le Corbusier

Analysis: Villa Savoye The plan analysis, how the formal and programmatic hierarchy informs each compositional element you analyze.

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9 International Style / The International Style Exhibit 1932

Analysis: Definition of an architecture, volume, asymmetry and ornamentation

10 Alvar Aalto / Italian Rationalism: Terragni

Analysis: Transformation

11 Louis Kahn / Johnson/Pei/Saarinen

Analysis: Monumentality

12 Brutalism & Team 10

Analysis:

13 "The whites vs. the greys"

Analysis:

14 "Postmodernism"

Analysis:

15 "Deconstructivism"

Analysis:

C. Example: Villa Savoye, Le Corbusier

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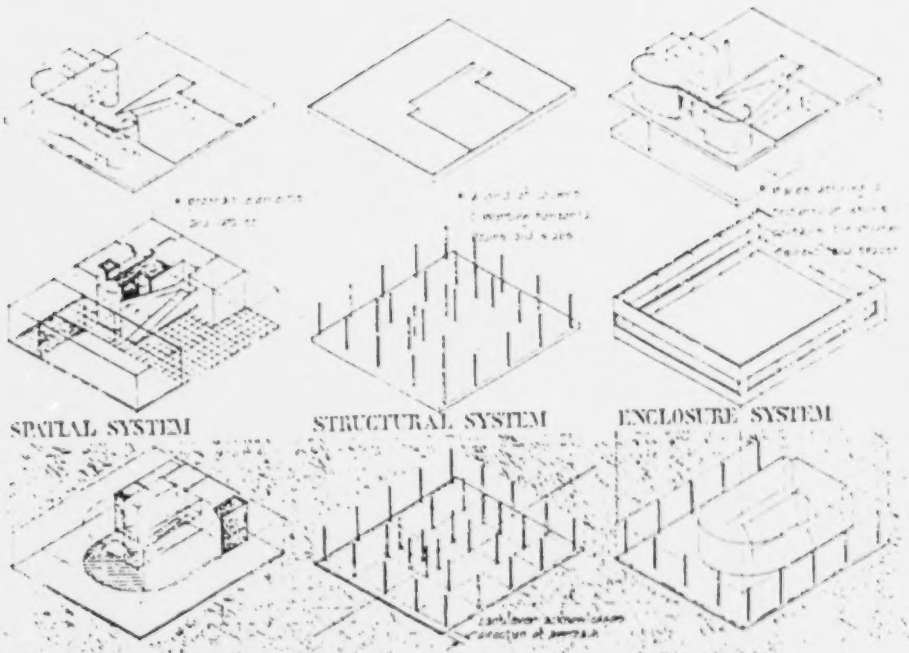
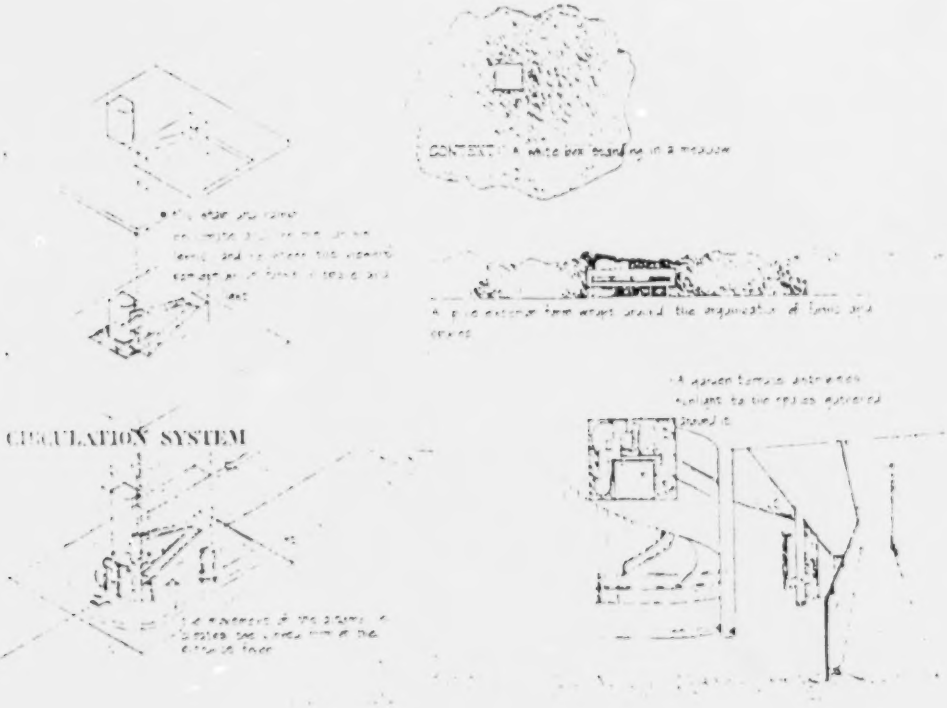


VILLA SAVOYE • POISSY, 1928-31 • LE CORBUSIER



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G. Cullen' Visual Language of the City. Grebner & Bermudez

Books on reserve in the library:

CD-ROM

Wiggins Glenn E. : Louis I Kahn. The Library at Phillips Exeter Academy:

Van Nostrand Reinhold 1997

The Frank Lloyd Wright Companion: Prarie Multimedia. Inc. 1995.

124ANL

AR124 HISTORY AND THEORY OF MODERN ARCHITECTURE

The intention of this project is to provide you the opportunity to analyse a work of architecture. Beginning with drawings, you are asked to suggest in drawings and text the ways and to what end the architect has manipulated elements and employed strategies to express a particular intent or idea about the building.

ASPECTS TO BE ANALYZED

A. Plan

The plan analysis should address the major floor of the work in question. Be aware of how you can best taylor your analysis to the specific project at hand. Also note the way in which a formal and programmatic hierarchy informs each compositional element you analyze.

1. Program The methods and techniques used for the expression of the program at functional and symbolic levels.

2. Geometry and proportion The sources of a geometric order, and the geometrical relationship between the parts, interior as well as exterior.

3. Axis The implied line(s) of composition. Be sure to distinguish between a circulation route and the primary compositional axes of the building. Note too that there may be secondary, more localized axes. How do the axes of the building coincide with axes of the site or context?

4. Circulation The path of movement through the building. Your drawing should illustrate the relationship between the path and the architectural order of the building.

5. Structure The load carrying (or apparently load carrying) elements and their relationship to the definition of the space.

6. Parti An abstracted diagram of primary organizational relationships. The parti may be gestural in nature, reflecting internal relationships and/or relationships of building to site.

B. Section

In one or more drawings, illustrate the sectional characteristics of the building while exploring the relationship between the parts in terms of proportion, scale, geometry, hierarchy, etc.

C. Elevation

Using the front elevation of the building, you should prepare separate diagrammatic drawings for each element of the organization. Think about how elevation and plan are related as you investigate different aspects.

1. Geometry / proportion An analysis of the geometrical order of the elevation

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2. Symmetry / balance A description of the location and effect of the axis of symmetry or of the point of equilibrium.

3. Scale How has the human figure been used as a determinant or generator of scale in the elevation?

4. Rhythm Isolate and illustrate the rhythm of the components of the elevation.

5. Texture / Surface / Materiality Describe the way in which the elevation is composed through the combination/juxtaposition of different texture or materials.

D. Structure

Prepare an plan which illustrates the principle load carrying members of the building.

E. Relationship to context

Describe the relationship of the building to its surroundings, inside and outside.

F. Intentions

Remember that the best analysis can be the most speculative and may address aspects that are not suggested here, but that you discover on your own. What are the rules that guide the design of the building? Are these rules ever broken to accommodate or express a special condition?

G. A Short Biography of the Architect.

PRESENTATION REQUIREMENTS Text (hand lettered and analytical drawings on, 8 1/2" x 11" format, including title with your name, course name and date.

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A Modest Projection

A Satirical Inquiry into the Demise of Community Colleges

By and copyright April 20, 1998

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"...I am sure that this must be work of that magician Frestón, the one who robbed me of my study and my books, who thus changed the giants into windmills to deprive me of the glory of overcoming them...but his evil arts shall not prevail against this trusty sword of mine."[2]

Late one Friday afternoon in the last year of the millennium this quotation from Miquel de Cervantes' "Adventures of Don Quixote" surged relentlessly through the mind of a very frustrated, seasoned community college professor who sat totally exhausted in a local coffee bar after the last class of the Spring semester. A class that had exhibited a spectacular lack of academic success and interest, the result of poor student academic preparation and being admitted to his course not having completed the appropriate prerequisite courses.

C. Barnstable Chips, Ed. D. , Professor of Rhetoric and Satire, had seen the windmills of educational technology turn countless times in his twenty-five tenured years. For thirty years he had tilted the windmills which automatically realigned themselves with each change in the direction of technology. For thirty years he had been importuned daily to embrace cutting edge pedagogical methods, not one of which had proved to be as effective as the time-tested Socratic method of teaching with its very strong affective domain component. These had been thirty years of little or no sincere and sustained institutional encouragement to his basic intellectual instinct to challenge the giants of his discipline and in doing so lift his students, his long line of squires, off the donkeys on which they presently traveled the world in search of their daily bread onto the unconquerable steeds of ambition.

---

[2] "Don Quixote", by Miquel de Cervantes. Part 1, Chapter 8 in which Don Quixote tilts at windmills.

Popular education, education for the masses, had blindly followed the mechanical model of the technological revolution that had initially supplemented the expenditure of physical effort in man's daily life with machines. Walking had been replaced by the bicycle, then by the automobile. The result was that although man was able to travel greater distances in his life, his natural physical well-being had deteriorated through a lack of physical exercise. The Industrial Revolution had seen the total reversal of the complementing of man's working day efforts with machines to the point where man was no longer the master, the pacesetter but the servant, the runner behind. During this period mankind lost its native intelligence, lost its survival instinct.

The leadership of many academic institutions had sought to first supplement then replace the mental effort on the part of the student with technology. The technology of education shared with the technology of the industrial revolution the propensity to be most productive and hence most attractive when engaged in repetitive, mostly mindless activities. Not unsurprisingly the inevitable happened. While facts and definitions *ad nauseam* were gathered, the unchallenged mind like the unchallenged calf muscle withered leading to the total absence of critical thinking skills, the hallmark of the educated person.

This inherent weakness, the inability to think, to construct a decision-tree and to predict the consequences of many different options had become the greatest obstacle to Professor Chips and his academic cohort as they strove to teach America in a traditional college class-room setting. In Dr. Chips' college the recognition of the level of academic success had regressed by economic necessity to the mere measurement of fact and definition acquisition. A few, at most two dozen, private colleges and universities had hung on to the quaint idea of critical thinking; the components of which reading, analysis, synthesis, creative thinking and writing were considered to be the essential attributes of an education.

One disturbing outcome of this dichotomy of education was that technically minded people, those who embraced technology, were the one's who increasingly shunned leadership roles in society. The fearsome horse of technology was bred apace but remained riderless. The leadership role in a society which faced a myriad of problems having no clear-cut answers had been assumed in earlier years by many of those from the middle and working classes with a liberal arts education whose reasoning powers went beyond a simple binary-driven universe. In the last two or three decades society had suffered because of the greatly diminished number of liberal arts graduates who instinctively shunned a technology-based education, the only mode of education now offered to the masses. Democracy suffered immeasurable losses as the *Elites*, educated in the traditional classroom setting of prestigious private colleges and universities gained greater proportional leadership in society at the expense of the working and middle classes.

Professor Chips' deep anguish caused him to voice his thoughts aloud such that a holographic stranger sharing the small coffee table could not help over-hearing Dr. Chip's agony. He leaned over to Dr. Chips and said:

"Excuse me Sir, but I couldn't help sensing your distress and the troubles that beset your institution. If I may, I would like to recount what happened at the institution from which I retired in 2010 and how the problems you are facing were solved gradually but relentlessly over the last ten years. It may help to ease your obvious frustration and distress."

Dr. Chips anxious to hear from his fellow educator invited him to continue with his tale, not realizing the obvious ambiguities of present and future time of which the stranger spoke.

The holographic stranger, looking very relaxed and dressed casually spoke enthusiastically to Dr. Chips ...like you we found that the state was reducing its support still further in real dollars every year, never ever having lived up to its promised fifty percent of tuition costs. At the same time the state unfairly mandated that increases in tuition could be no greater than the inflation rate.

In the late nineties the inflation rate was about 2% hence the opportunity to raise tuition revenues was small. We continued to increase technology fees, the hidden costs, and were even sued several times for charging fees for technological support that was not fully provided.

We attempted to balance the budget using many imaginative approaches, which included downsizing, making positions part-time, and privatizing.

The earliest significant approach involved downsizing the full-time faculty body by not replacing tenured faculty members who retired or who died. Their replacements formed a huge army of part-time adjuncts who were paid considerably less than the full-time faculty. Another approach was to reduce the size of the line administrator ranks by replacing them with program directors who were essentially a form of a hybrid of an administrator and an adjunct faculty member. Several interesting developments arose from this action. The strength of the countervailing force of the faculty union was diminished as the directors were not eligible for membership in the faculty association. In not possessing academic rank the extent of academic freedom exercised by these "at the monarch's pleasure" employees in the institution decreased considerably so much that the academic and viable future of the institution was compromised. Very few of the new academic administrators were hired with academic standing or were subsequently offered tenure. This again reduced the strength of the countervailing opinion, a force so vital when decision-making is made in an autocratic manner at a time when the effects of the forces of change are so

diverse that they are beyond the comprehension of any single individual no matter how experienced, intelligent or sincere.

For many reasons, mostly economic, we did not monitor the adjuncts very closely After many years and much soul-searching it was finally admitted that the adjunct faculty were in effect independent contractors; persons hired to do "what" but not told "how to do what." This, essentially the privatization of the academic activity, was to be the first such effort in the college.

It should be mentioned that prior to this period there was no question that full-time faculty met the definition of *employees*, academic freedom notwithstanding, by virtue of their assigned courses and an on-going process of evaluation and feed-back through formal evaluations, in-house instructional seminars, faculty development and participation in college committees. The adjuncts on the other hand were different. We recognized that it was physically impossible to visit them in class, enough times per semester, to gauge the level of their performance as this would have taken an army of assistant deans that would have cost as much as the full-time faculty being replaced. Quite frankly we were afraid of what we might find. We could not hear from or judge the adjuncts in college committees which they were not expected to attend. The Adjunct Institute was not always attended by adjuncts and was very general, not discipline specific in nature. Great reliance was placed on student evaluations, which on the whole were very favorable. Sadly when we looked into the matter more deeply, we found that the adjuncts in order to be rehired were very lenient with the students in terms of academic expectations and grading, much more so than the tenured faculty members. Over-achieving students gravitated to the full-time faculty members while many under-achieving and 4.00 GPA obsessed students sought out the adjuncts. It turned out that the adjuncts of the eighties and nineties were not like those of the early sixties, who had been business or career professionals teaching one course to keep in touch with

academe; rather they were in fact academic gypsies traveling the by-ways of three or four contiguous counties stitching together a full teaching load at two or three different colleges without health benefits or pension plans. It was generally understood but never stated publicly that this academic slave trade was a national disgrace. It was never addressed.

We discovered not unreasonably, that the adjunct gave precisely what he or she earned after a semester or two of showing the flag of effort to be re-hired. We knew this to be exceedingly unfair to the students who were paying relatively costly tuition earned by working thirty or more hours per week, in anticipation of being taught by full-time faculty. Full-time faculty offered office hours and served the students in many ways by serving on college committees, advancing the mission of the college, engaging in ongoing professional development, mentoring, writing letters of recommendation, academic advising and counseling. Adjunct faculty offered none of these services. This was particularly unfortunate as some students took a degree without even having one full-time faculty member.

Our institution became enlightened and considered reversing the trend of two decades by offering tenure track appointments to well-qualified, young graduates. While not requiring academic research publishing as a criteria for obtaining tenure, displaying scholarship in one or more of several approaches to teaching was to be strongly encouraged, supported and expected. The consideration and implementation of this radical reversal in policy was however held in abeyance pending further research and discussion by a committee formed to address the question.

Another approach to balancing the budget enacted in the late eighties and early nineties was the privatizing of all college ancillary operations.

The child-care center was asked to pay market-place rent for its use of the college's facilities. The non-educational community service programs of the college reverted to the YMCA and the Red Cross resulting in

significant reductions in staffing and building maintenance costs. The very few students who had used these facilities were given reduced cost passes to the YMCA.

The next round of privatizing included the bookstore, the food service, campus security, maintenance and the computer center. The need for the print shop had been eliminated as a result of improved print technology and the extensive use of multi-media technology.

The privatization approach was to put these college operations out for bids with the successful bidder giving the college a steady income stream for the privilege of serving the college. The idea of a fixed income based upon rental income for the space in the college that the private vendor operated and a percentage of the sales each semester was especially attractive to the vice-president of administrative affairs since it reduced one of the perennial challenges of the job.

However privatization did have severe negative academic consequences. The book store in order to meet the ever-increasing annual payment which was based upon the rent for the college property which the book store occupied and a percentage of the annual sales to the students, including food items, raised the price of text-books well-above the new book prices recommended by the text book publishers. Students who sought to escape from the very high costs of new texts purchased used books which were bought back by the book store at rock-bottom prices and then resold at almost the same price as new texts, meaning that the students' savings were small, while the possibility of re-selling a twice-used book was negligible. In many cases new text-books were not offered by the book store so that supply of used books was kept low thus increasing the price of the used books while at the same time reducing the book retailer's payments to the publisher and text-book authors, payments to authors and publishers not being made on second-hand books. Intellectual property lawyers took an interest in this re-sale activity and legislation is pending in Congress to

protect the ongoing interests of intellectual property owners. Low level inventories in the privatized store [occasioned by waiting for second-hand books from other colleges] meant that textbooks frequently arrive one or two weeks into the semester.

It was discovered that the increased burden of textbooks had several effects. We lost students to other institutions that kept book prices in line with national prices. Many students simply did not buy the required text on time or indeed at all so that the academic performance of the individual student and the entire class suffered.

Students were forced to spread their studies over a greater time period; many dropped out of a full-time program to attend part-time. For all students, especially the younger ones, this was extremely costly in that by delaying their entry into a chosen career by two or three years meant that they lost considerable income compounded over the succeeding years. The college came to the conclusion that privatizing the bookstore was extremely shortsighted and did not fit well with its stated mission to serve the citizens of the county. It considered taking the bookstore operation back in the belief that through effective management and lower prices a significant increase in enrollment could be related to this move. This move again was held in abeyance pending more research and discussion by a committee formed to address the question.

The privatizing of the food service brought an annual rental income to the college and a percentage of the food sales. Once again the vice-president for administrative matters was pleased to have a steady source of an increasing annual income.

The academic side saw a downturn however as the caterer sought to cut corners in service and quality. As the foodservice deteriorated members of the full-time support staff chose to go on a diet or to brown bag their lunches, as they did not have time to patronize a local restaurant. This lead to lower revenues for the caterers which in turn resulted in fewer food

service workers, more delays during lunch time and still more cost-cutting with the result that the food became extremely unappetizing, unimaginative and expensive. A noticeable reduction in support staff productivity in the afternoon due to poor nutrition was observed. At lunchtime there was an almost total disappearance of students who chose to eat at or on the way home; this caused a dramatic decrease in afternoon enrollment. Faculty members chose to go home directly after morning classes rather than eat lunch in the cafeteria and then spend the afternoon working in their offices.

The caterers had insisted on a clause in the contract to provide, at considerable cost, all food other than personal food consumed on the premises. This resulted in a significant decrease in student fund-raising activities with not only the loss of funds for student clubs and the non-profit organizations they were supporting but also a loss of collegial fellowship.

The reduction in food quality was seldom monitored by the senior administrators who had ample excuses to eat off-campus every day.

Research suggested that taking the food service back, even subsidizing it to a modest extent in conjunction with the institution's hospitality program would increase enrollment and improve the general tenor of the institution. This approach was considered but again held in abeyance pending further discussion in a committee formed to address the proposal.

The privatization of the security force also resulted in a great deal of impersonality developing as the minimum wage employees of the security firm felt no loyalty or incentive to learn the culture and to know the personnel of the institution they were guarding that particular day. This had a tangible negative effect on the social environment of the college.

The computer operations at the college, both educational and administrative, were also privatized. The disconnect between the computer company's belief in what it thought were the faculty's academic needs and the needs as seen by the faculty was never even partially resolved. It was

very much akin to the conflicting views of the care-needer and the care provider of profit-seeking HMO's. It seemed that from the day the private computer company assumed, one hesitates to use the word "control", half the messages on the college's voice and e-mail mail systems were related to computer operations problems. This greatly reduced staff and faculty productivity and increased frustration.

The maintenance at the college, now in the hands of private contractors greatly improved its appearance in that the motive of the very same people who had worked in the college maintenance department was not now to avoid work, but to find work as the more work the contractor undertook, the more his newly hired, ex-college employees earned. The college looked cleaner and more attractive than it had in years when the college budget was consistently balanced by reducing necessary maintenance. It was felt that enrollment increased. A noticeable increase in support staff productivity was observed while the number of sick and personal days taken decreased dramatically.

Attempts were made to sell the seldom-used, almost-new video conferencing facilities that had been rendered obsolete overnight as technology hop-scotched to a point where participants were able to view the presentations in real time over the Internet using their desk or lap top computers. Due to its specific structure it was a white elephant for many years until it was sold as an indoor, in-line skating rink, when it was pointed out that the amphitheatre seating area would make an excellent, Olympic-size obstacle course, in-line skating now being an Olympic sport.

Professor Chips listened attentively as his new friend, who had not introduced himself, paused to sip a Latte Grande before saying:

The members of the Board of Trustees recognizing the gravity of the situation decided, before reversing the privatizing of the teaching activities, the book-store, the food-service, the security, maintenance and computer

operations, to complete the full circle of privatization and downsizing by following the example of corporate America by considering the privatization, part-timing and downsizing of the administration.

"They didn't tackle that sacred cow, did they?" gasped Chips.

"Yes and No!" replied the stranger.

Interwoven in the folklore of educational management is the firm belief that every problem has its own expert to solve it. The natural inclination is to employ the expert problem solver, so he or she can research, live with and even nourish the problem for the next twenty years. The problem and the expert soon become so fused together that it is often impossible to separate the problem and the expert. In this way not even the severest critic could contend that the problem was not being worked upon.

After hiring a series of in-house experts, the administration at the insistence of the Board of Trustees called in an outside expert, who as we found out later, like most outside experts, had written the first draft of her final report on the plane as she came to our campus for her first visit. After all contemporary educational folklore tells us that there is but one all-purpose solution to all educational problems, take money out of the classroom and use it to hire a director, an in-house expert, to marry the problem, especially when the problem is described in great detail and the solution hinted at in the letter of invitation to the expert.

Recognizing the necessity to maintain the integrity of the hand that fed her, the expert, first sought solutions to the crisis in areas inside the lower echelons of administration. But to her dismay her usual first line solution had been tried; the institution was awash with directors. The directors recalled the behaviour of wild beasts in that they gathered together in physical proximity at the waterhole, the lunch table, for mutual protection but kept an academic distance from each other to preserve their particular programs. This lack of a co-ordinated effort meant that the institution could not rely upon them to collectively address college-wide problems, unlike the

ongoing contributions of the faculty senate. Looking at her second line of attack, outside the administration, she found to her dismay everything external to the administration had been privatized including the use of temporary staffing personal to replace the support staff. The visiting expert was forced to amend her first unpresented draft to include revolutionary things such as having published organizational charts where job descriptions and responsibilities were clear for all to see. She even suggested that the recent proliferation of administrative in-house expert positions could be reversed by changing job titles and descriptions and having the most important activities of different individuals "bundled" in a logical manner to be undertaken by fewer people. Realizing that she was plowing new ground, that her work was valuable intellectual property and hence salable to many Boards of Trustees beyond her present commission she abruptly changed her allegiance by strongly advocating part-time administrative positions, downsizing and even privatizing enrollment, accounting and marketing. The proposal was a masterpiece of managerial economic sense. The expert's philosophy, based upon many years of experience, was to have an administration whose size was realistically designed to serve the demonstrated higher education needs of the area served by the institution rather than having to shake the bushes for additional students in order to support the ever growing administration; a shaking which resulted in enrolling academically poorly prepared students who raised the average cost of educating a student at the institution because of the increased need for remedial classes and a lower retention rate. She recommended that while the college retain its open-door policy it re-direct its limited funds used to provide financial aid/scholarships and remedial support for students with long-term minimal academic performnces to true scholarship support for students with superior academic performances. The administration received and read her report, quickly paid her off and held it for further discussion, this time without a committee. With the external expert's report securely

under wraps, those who would lose their jobs if it were implemented like anyone in their position prayed for a miracle.

Chips now totally bewildered impatiently asked the stranger. "Did you finally solve your problem?"

" Well we didn't; it solved itself."

The prayer was indeed answered; a miracle occurred and I happy to say that the mission of the college, to educate the citizens of the county is being met in a very effective manner even though the entire college operation progressed beyond down-sizing and indeed no longer exists.

Charlie Chips looked puzzled and demanded an explanation.

"*Technology*, Old Man," the stranger said with a wry smile, "*Technology*.".

It all began with two basic propositions.

1. The abandonment of any pretense of teaching critical thinking.
2. The total acceptance of distance learning as the educational technology, that would drastically cut costs, to be the only form of instruction offered in the future. The institution was already offering a degree in English entirely through T-V courses.

But as you know from the Circular Flow of Income concept, what is cost to the buyer is income and employment to the seller. Cut the costs, cut the income and cut the employment. The Iron Law of Economics.

As a result of distance learning in which the student studied at her home at night or at her office during the lunch hour the need for expensive new buildings, bookstore, food service, security and maintenance disappeared over-night. Each student had to have access to a computer at home and at work. The increasingly–expensive investment in ever-changing technology was transferred from the institution to the student.

During the interim period the reduction in faculty, support staff, administration, buildings and other facilities meant that the work of the vice-president of administrative affairs became a part-time contracted-out activity performed by a former dean of business studies who operated out of her home on an as-needed basis, usually two mornings a week schedule. Students paid the college by credit card for each lesson in their courses, which the college initially contracted, from a number of different colleges including the University of Phoenix and textbook publishers. ATT-Small Business Services did all the college's financial work making the college's accounting activities redundant.

The last full-time faculty member retired several years ago and the college was then fully staffed by adjuncts. Students downloaded their packets by e-mail and bought any textbooks from www.amazon.com over the Internet.

A year later a private temporary staffing company, a spin-off of Kelly Girls Inc., established a nationwide web-page which matched adjunct faculty who bid competitively for the opportunity to teach the courses with students who signed up for courses over the INTERNET. Market forces made tuition costs plummet so that Federal and local government financial support was neither needed nor offered. A division of TRW's Consumer Credit Bureau checked faculty credentials with the success/failure profiles of each instructor being measured. Adjunct instructors who were too demanding were never hired again.

This poly-site process, similar to the Thomas Edison College of New Jersey, had its birth in the proliferation of articulation agreements that had originally started within each state of the union but had reached the global scale as educational institutions competed for the diminishing educational dollar, yen and euro.

Naturally the post of college president had evaporated since there were neither college staff to administer nor fund-raising for new buildings

and equipment to be undertaken. During the brief transition period the presidency, strictly a ceremonial post, was assumed by the chairman and only member of the Board of Trustees which has also been down-sized since the county has all but given up on funding an operation that has been essentially privatized and lost its specific identity with the county.

For two years Commencement exercises were held in a local Moose Lodge rented for the occasion with a disc jockey playing Land of Hope and Glory between a nostalgic mix of Frank Sinatra, the Rolling Stones and Aerosmith. At the first of these graduation exercise it was grudgingly admitted that the Commencement with no faculty and administrators present was in reality a gathering of strangers and quite bizarre. The final blow came in the next and last year when the invited guest speaker failed to put in an appearance via satelite-tv. The Commencement speaker was a last minute candidate since it was impossible to find any politician of consequence who wanted to be a virtual graduation speaker. It turned out that the speaker, a distance learning instructor, was suffering from a severe case of depressive-agoraphobia as a result of working in total physical, professional and academic isolation in his home office and teaching some fifteen different courses under fifteen different pseudonyms for fifteen years. It was finally brought to the crisis stage by the realization of having to reveal at least one identity, since he was not qualified in any of the courses he taught. He had only audited them over the Net while having paid experts to assist him as he took his examinations over the Net while staring into the retina identification surveillance system. It was later revealed that he had not been out of his house since being graduated from kindergarten at which time he had been introduced by well-meaning parents to home education on the Internet. His fear of the outside world was so intense that when his parents, who knew of a life outside computers, relocated several times he had to be moved in an upholstered shipping crate to the new house.

This experience caused commencement to be abolished. When the graduating student passed her last examination in her final course, the computer automatically and immediately downloaded her diploma onto her home computer and played Elgar's famous Commencement music. Students who did not have a color printer had to make arrangements to pick a color copy of it up at Kinko's who, for an extra dollar, affixed a gold seal for students who were graduated with honors. Nostalgic students who had started their education before the full-scale substitution of distance-learning for the traditional class-room format could choose to download and play one of ***"the Most Memorable Commencement Speeches of the Twentieth Century,"*** while sharing a Domino's graduation pizza special with their families. For many families this was a most momentous moment when the student emerged from her bedroom/ home office to join her family for a couple of hours until she started studying for her next degree.

The initial introduction of distance learning with the subsequent down-sizing of the administration and the resulting not inconsiderable reduction in the costs of running the institution lead us all to believe that the manner in which the administration introduced distance learning was to be the salvation of the extant county college. Ironically it was this eventual total reduction in the overhead costs of the administration, the support staff and maintenance made it possible for every student to acquire an education through technology, at the same cost that he or she had been paying for tuition prior to the demise of the county college and at no cost whatsoever to the state or county taxpayer.

That was not the end of the story for it soon became apparent that with the exception of the Ivy League colleges and a few other private colleges, all future education was to be offered over the INTERNET by BGU, Bill Gates University, which had assumed majority ownership of the publicly traded University of Phoenix. Gates, through his BGU, was to

profit immensely from the pioneering activities of the community colleges that had made distance learning a household name and activity.

As expected Bill Gates' wealth increased fifty fold when he offered distance learning on a global scale after the additional acquisition of several text-book publishers that had developed materials for distance instruction and education. TIAA-CREF's propitious investment in Microsoft meant that fifty percent of America's new millionaires were former college professors. To show his appreciation for the pioneering work of the community college and to reduce his corporate income tax payments Mr. Gates created a museum dedicated to the all-too-brief era of the community college at an abandoned community college in a metropolitan area. Many people planned a visit to it when on vacation. Instead Mr. Gates, as he had done with his fine art collection, rendered many virtual images of the campus buildings with hired actors many of whom were former adjunct instructors posing as faculty and students simulating highly interactive and very stimulating lectures. He then converted the campus into one of his retirement home campuses. There would be no Williamsburg of Community College life. This was very unfortunate for it had been determined that one out of every two Americans had taken at least one course at a Community College during the brief history of the Community College Movement. These former students and their grandchildren can still visit the museum via its web-site on two days of the week for a minimal fee with a visit on Sunday before noon being free.

Lest the reader be nostalgic for the passing of the community college, he or she should take comfort in the realization that every organizational entity has to conform to the classic "four stage life cycle" Introduction, growth, maturity and decline. Anguish may only be felt when one is present in close proximity at the decline stage.

The profit potential for the post community college model was so great that a virtual Hall of Fame honoring leading lights of the Community

College movement, mostly administrators with one or two teaching faculty members, was built by a consortium lead by Rupert Murdoch in co-operation with Bell Atlantic and IBM when seeking community and political support in challenging Bill Gates for the educational monopoly.

Later a few charter community colleges staffed by concerned volunteering grandparents emerged to offer lower middle-class students a classical, non-technology-based education. It was suspected that the movement would not amount to much and in being ignored by the politicians and the private sector remained underfunded.

A popular misconception is that there is but one single law of supply and demand; no such law exists. A massive demand for a product, say the old-fashioned Socratic method of teaching and learning, will not automatically say that it will be provided. Absent any significant government subsidy, none or very little will supplied if it costs too much. A few die-hard traditionalists argued that there would always be students who would prefer teachers. They overlooked the fact that kindergarten through high school had converted to distance learning and so the new generation of students had no concept of the Socratic method of education.

It should be noted that every motel-room in Fort Lauderdale still sports a computer and printer and that the famous Spring Break has become an all-year round activity. Every effort was and is still made by the local police forces to strenuously discourage student drinking lest the ensuing serious discussions in the local bars, on the beaches and in the motel rooms create an unwelcome renaissance of critical thinking and all the negative economic ramifications of lecture-driven colleges.

In conclusion, society should be grateful for the last unselfish effort of enlightened administrations that successfully overcame the reluctance of an aging faculty mired in ***"out-of-date"*** methods of teaching and replaced them with technology. This brave, self-sacrificial action meant that every world citizen whether here or abroad who is linked to the INTERNET can

acquire an education, albeit superficial and incomplete, at a relatively low cost. To-date no assessment of the long-term academic, emotional, psychological and social costs of obtaining an education in virtual isolation has been attempted; nor, it is suspected, will it ever be.

Post scriptum: Having received an insight into the inevitable future of the community college Professor Chips with a rare broad smile confessed to the stranger that he was now going to apply for the terminal sabbatical being offered at his institution and devote himself full-time to perfecting the newly-introduced student model of his fully upholstered, shipping crate with built-in Barcalounger and built-in computer system that is being made from the pieces of the windmills against which he had tilted for so many years.

Author's footnote. The intellectual catalyst for this work was Jonathan Swift's "Modest Proposal" in which Swift expressed his concern for the great number of nutritionally starving children in Ireland at the time of his writing by proposing a totally unacceptable satirical solution to cast a light on the problem. Swift knew that the proposed solution of eating the starving children would never be enacted or come to pass.

This author who has an equal or even greater concern for the intellectual starvation of America's children, believes with much sadness that popular higher education has taken far too many steps along this particular road of no return. The soft-tissues of community colleges, the academic institution born in the sixties, weaned in the seventies, matured in the eighties will be consumed in the first decade of the next century leaving the bones as retirement homes, office parks and other non-educational facilities.

Can the author offer a single word of encouragement? Pragmatically, No!! Rather he offers the observation that since mankind, unlike every other living being on the planet, is a ***"piece of work"*** in

progress, people of goodwill can, with a sustained and a sufficient interest, guide mankind in its moments of folly. Please keep watching.

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